ISSN 0181-0626

BULLETIN du MUSÉUM NATIONAL d'HISTOIRE NATURELLE

PUBLICATION TRIMESTRIELLE

SECTION A

Zoologie

biologie et écologie animales

4e SÉRIE, T. 18, 1996 (3-4)

ÉDITIONS SCIENTIFIQUES DU MUSÉUM, PARIS

Source : MNHN, Paris

SHOUT
SHARE
IT

ÉDITIONS SCIENTIFIQUES DU MUSÉUM, PARIS

BULLETIN DU MUSÉUM NATIONAL D'HISTOIRE NATURELLE

57, rue Cuvier, 75005 Paris

Section A : ZOOLOGIE

Rédacteur en chef : Christian ÉRARD
Rédacteur adjoint : Danielle DEFAYE
Assistante de rédaction : Florence KERDONCUFF

S'adresser
pour les échanges :
Service des périodiques et des échanges de la Bibliothèque Centrale
du Muséum national d'Histoire naturelle
38, rue Geoffroy Saint-Hilaire, 75005 Paris
Tél. : [33] 01 40 79 36 41

pour les abonnements et achats au numéro :
Éditions Scientifiques du Muséum - Diffusion
57, rue Cuvier, 75005 Paris
Tél. : [33] 01 40 79 37 00
Fax : [33] 01 40 79 38 40
e-mail : dhenry-mnhn

pour l'envoi de manuscrits :
Éditions Scientifiques du Muséum - Rédaction du Bulletin
57, rue Cuvier, 75005 Paris
Tél. : [33] 01 40 79 34 38
Fax : [33] 01 40 79 38 58
e-mail : bulletin@mnhn.fr

Abonnements pour l'année 1996 (prix HT) :

Abonnement général : 1 800 FF
Section A : zoologie, biologie et écologie animales : 800 FF
Section B : botanique *Adansonia* : 500 FF
Section C : sciences de la Terre, paléontologie, géologie et minéralogie : 600 FF.

Numéro d'inscription à la Commission paritaire des publications et agences de presses : 1403 AD

Source : MNHN, Paris

Bulletin du Muséum national d'Histoire naturelle, Paris
4e série, 18, 1996, Section A (Zoologie, Biologie et Écologie animales) nos 3-4

SOMMAIRE

Alain DUBOIS & Annemarie OHLER. — Early scientific names of Amphibia Anura. I. Introduction 297-320

Alain DUBOIS & Annemarie OHLER. — Early scientific names of Amphibia Anura. II. An exemplary case : *Rana arborea* Linnaeus, 1758 321-340

Edward B. CUTLER & Norma J. CUTLER. — Sipuncula from the Indian Ocean and New Caledonia 341-365

Gabriel N'ZOBADILA, Johnny BOYER & Marie-Claude DURETTE-DESSET. — Morphogenèse d'*Heligmosomoides polygyrus polygyrus* (Dujardin, 1845) (Trichostrongylina-Heligmosomoidea) chez *Apodemus flavicollis* en France. Comparaison avec les espèces proches : *Heligmosomoides laevis* (Dujardin, 1845) et *Heligmosomum mixtum* Schulz, 1954, parasites d'Arvicolidae 367-385

Robert G. MOOLENBEEK & Dieter RÖCKEL. — Cones taken off Wallis and Futuna Islands, South-West Pacific (Mollusca, Gastropoda, Conidae) 387-400

Anatoly A. SCHILEYKO. — *Guamampa* n.g. (Gastropoda, Pulmonata) an "intermediate link" 401-408

David G. HERBERT. — A critical review of the trochoidean types in the Muséum d'Histoire naturelle, Bordeaux (Mollusca, Gastropoda) 409-445

John S. BUCKERIDGE. — A living fossil *Waikalasma boucheti* n.sp. (Cirripedia, Balanomorpha) from Vanuatu (New Hebrides), Southwest Pacific 447-457

Stefano TATTI and Franco FERRARA. — The terrestrial Isopoda of Corsica (Crustacea, Oniscidea) 459-545

Christopher C. TUDGE. — Spermatophore morphology and spermatozoal ultrastructure of the recently described hermit crab, *Strigopagurus boreonotus* Forest, 1995 (Decapoda, Anomura, Diogenidae) 547-555

Alain CROSNIER. — *Hypocolpus pararugosus*, espèce nouvelle de l'Indo-Ouest Pacifique (Crustacea, Decapoda, Brachyura, Xanthidae) 557-564

Nguyen NGOC-HO. — Redescription des types de *Naushonia perrieri* (Nobili, 1904) (Crustacea, Decapoda, Laomediidae) 565-570

Ourida ABROUS-KHERBOUCHE & Jean-Paul MAURIES. — Découverte du genre *Archipolydesmus* en Algérie : description de trois espèces nouvelles (Diplopoda, Polydesmida, Polydesmidae) 571-587

Source : MNHN, Paris

Patrick MARECHAL. — *Psalistops gasci* n.sp., première Barychelidae de Guyane française (Araneae, Mygalomorphae) 589-594

Claire VOISIN & Jean-François VOISIN. — Liste des types d'oiseaux des collections du Muséum national d'Histoire naturelle de Paris. 4. Hérons (Ardeidae) 595-609

Les articles du présent volume doivent être cités comme suit / The articles of the present volume should be cited as follows:

DUBOIS A. & OHLER A. 1996. — Early scientific names of Amphibia Anura I. Introduction. *Bulletin du Muséum national d'Histoire naturelle*, Paris, série 4, C **18** (3-4) : 297-320

ou / or

DUBOIS A. & OHLER A. 1996. — Early scientific names of Amphibia Anura I. Introduction. *Bull. Mus. natl Hist. nat.*, Paris, sér. 4, C **18** (3-4) : 297-320

Source : MNHN, Paris

Bulletin du Muséum national d'Histoire naturelle, Paris, 4e série, **18**, 1996
Section A, n°s 3-4 : 297-320

Early scientific names of Amphibia Anura
I. Introduction

by Alain DUBOIS & Annemarie OHLER

Abstract. — This paper opens a series of publications meant at ascertaining and stabilizing the status of early scientific names of Amphibia Anura. Before starting the analysis of the status of these names, we present a rather detailed discussion of several important rules and problems of zoological nomenclature, which will be the basis for proposals and decisions presented in the forthcoming series of papers. We examine here the following general questions: the status of *nomina oblita* and of *nomina dubia*; the "suppression" of names by the International Commission on Zoological Nomenclature; the nomenclatural role and importance of name-bearing types (onomatophores) and type-localities (type-populations); the availability of scientific names; the distinction between different kinds of names and spellings; the distinction between three categories of syntypes; the criteria and conditions for lectotype designations; the status of type-locality restrictions; and the relative priority between names published simultaneously.

Key-words. — Status of early scientific names, nomenclature, International Code, International Commission, name-bearing types, type-localities, Amphibia, Anura.

Noms scientifiques anciens d'amphibiens anoures
I. Introduction

Résumé. — Cet article est le premier d'une série de publications qui auront pour but de confirmer et de stabiliser le statut des noms scientifiques anciens d'amphibiens anoures. Avant de commencer l'analyse du statut de ces noms, nous offrons une discussion assez détaillée de plusieurs règles importantes et de problèmes de la nomenclature zoologique qui seront à la base des propositions et des décisions présentées dans la série d'articles inaugurée par celui-ci. Nous y examinons les questions générales suivantes : le statut des *nomina oblita* et des *nomina dubia*; la « suppression » de noms par la Commission internationale de Nomenclature zoologique; le rôle nomenclatural et l'importance des types porte-noms (onomatophores) et des localités-types (populations-types); la disponibilité des noms scientifiques; la distinction entre différentes catégories de noms et différentes orthographes; la distinction entre trois catégories de syntypes; les critères et les conditions pour la désignation de lectotypes; le statut des restrictions de localité-type; et la priorité relative de noms publiés simultanément.

Mots-clés. — Statut de noms scientifiques anciens, nomenclature, Code international, Commission internationale, types porte-noms, localités-types, amphibiens, anoures.

A. DUBOIS & A. OHLER, *Muséum national d'Histoire naturelle, Laboratoire des Reptiles et Amphibiens, 25 rue Cuvier, F-75231 Paris cedex 05.*

PRELIMINARY NOTE

In this paper and in forthcoming papers of this series, the expression "the Commission" refers to the International Commission on Zoological Nomenclature, and "the *Code*" to the *International Code on Zoological Nomenclature* (ANONYMOUS 1985). The following expressions, which are used in the *Code* or derived from expressions used therein, will always be written with a dash, in order to show that they are well defined formulae with a precise technical meaning: species-group, genus-group, family-group and class-group (names); type-specimen, type-series,

Source : MNHN, Paris

type-species, type-genus, type-locality, type-population, syntype-species, syntype-genera, name-bearing type. Finally, Latin scientific names which are written between quotation marks are names which are not nomenclaturally available according to the current *Code*.

INTRODUCTION

Since 1758, the year that was arbitrarily fixed for the beginning of availability of Latin scientific names of animals within the frame of the *Code*, about 2 millions scientific names have been proposed for animal taxa (HAMMOND 1992). The vast majority of these names were published during our century, after rules for zoological nomenclature had been devised and adopted by the international community of zoologists. A much smaller number of names were published between 1758 and the end of the 19th century, but these names are of particular importance, since they are the oldest ones and have therefore a high probability of remaining the valid names for the taxa they designate.

Most of these ancient names were published in books or papers that are now the classical works of zoology, and one would expect these names to be well known, and their nomenclatural status to be firmly established and stabilized. Strangely enough, careful examination of these famous old works shows that this expectation is not borne out. As a matter of fact, many of these classical works contain a number of names the status of which has not been properly studied and stabilized by recent taxonomists.

While many of these old names are still currently in use to designate taxa considered valid by present-day taxonomists, many others are not. Some names are not used because they are considered junior synonyms or homonyms of valid names, or for more specific reasons, *e.g.* because they have been expressly "suppressed" by the Commission. These names, although they are not currently used, are not forgotten, and they are usually quoted in synonymies of names now considered valid. Unless they have been "suppressed" by the Commission, they remain therefore available and are not infrequently resurrected to designate new taxa, as the taxonomy of an animal group evolves and more distinct taxa are recognized. But other names remain unused without being properly allocated to any given taxon. These include both names that have been "forgotten" by most or all members of the international scientific community ("*nomina oblita*"), and names which have not been completely forgotten, but the status of which is unclear, since the information associated with the original publication of these names does not allow a clear allocation of these names to biological taxa ("*nomina dubia*").

"*NOMINA OBLITA*" AND "*NOMINA DUBIA*"

Several attitudes can be and have been adopted by taxonomists towards *nomina oblita* and *nomina dubia*.

Some taxonomists consider that these names should be definitively forgotten, and for example should not be quoted any more in synonymies, checklists and catalogues, "perhaps in the hope that 'they would go away'" (DUELLMAN & LYNCH 1981: 237). In other cases, some authors ask for the "suppression" of these names by the Commission. For many taxonomists, "abandon-

Source : MNHN, Paris

ment" of these old names is justified by the fact that they were often poorly defined in the original publications where they were created and should not be used for taxa recognized in modern days through the use of more detailed methods and elaborate techniques, such as bioacoustics, protein electrophoresis or other biochemical methods, etc. (see *e.g.* BOHME & WIEDL 1994: 39). Finally, other taxonomists think that such names should be "suppressed" simply because they have not been used for a long time, and that their "resurrection" would "threaten the stability of nomenclature". However, this is true only in some cases, because, very often, the biological taxon represented by such a "forgotten" name has had several successive names, or has been very seldom mentioned in the scientific literature, so that one cannot seriously speak of a long and "current" usage. The term of "stability of nomenclature" has a meaning only when long periods of times and high numbers of publications and of independent authors are involved. Understanding of these limitations is clearly the reason for the suppression, in the last edition of the *Code*, of the so-called "*nomen oblitum* rule" which existed in Article 23b of the 1961 and 1964 editions (ANONYMOUS 1961, 1964). In the current 1985 edition, there is no such rule, and "suppression" of a *nomen oblitum* or of a *nomen dubium* can be obtained only through an application to the Commission followed by the vote of an "Opinion" by the latter, but not by any "automatic" rule.

The opposite attitude towards these old names, which we have been strongly advocating for many years (see *e.g.*: DUBOIS 1977: 255, 1981, 1984, 1987; DUBOIS *et al.* 1988; DUBOIS & OHLER 1995), is that every efforts should be made to allocate properly these ancient names, through the use of the normal provisions of the *Code*, so that they stop being a potential cause of doubt or of instability in zoological nomenclature. Such a proper allocation very often (although not always) requires the recourse to a lectotype or neotype designation. Once this is done, the taxonomic status of the name is definitively fixed, and subsequent authors are free to use it either as a valid name or as an invalid synonym, but not to ignore it. We believe that the generalization of such an attitude towards ancient names would rather quickly lead to the disappearance of most of the nomenclatural problems related to these ancient names, some of which have already been the matter of very numerous, and sometimes "endless", discussions among zoologists. Some of these long discussions could have been avoided by a proper study, understanding and use of the existing rules of the *Code*. The latter unfortunately remains too little understood by many taxonomists, who tend more and more to appeal to the Commission to solve nomenclatural problems which could be solved otherwise.

"SUPPRESSION" OF ZOOLOGICAL NAMES

We fully concur with HOLYNSKI (1994) that the recent tendency of the Commission to "suppress" more and more zoological names has been extremely exaggerated and has done a great deal of harm to the "image" of the *Code*. It is our feeling that the Commission has not properly played its role of "Keeper of the Law" in front of the international community of zoologists. Rules that are too often overlooked or circumvented are no more convincing to anyone. Furthermore, in more and more cases, it is clear that recent zoologists are deliberately ignoring

Source : MNHN, Paris

the existing rules to follow "their own" rules (see *e.g.* the Mycetoglossini/Hemidactyliini case: WAKE 1993; SMITH & WAKE 1993, 1994, 1995; DUBOIS 1994, 1995b). This tendency, if continued and supported by the Commission itself, is liable to lead soon to the ruin of the international consensus on the *Code*, and to the disappearance of the universality and stability of names among zoologists.

After others, HOLYNSKI (1994) has dealt with these problems in a long and detailed discussion, which we strongly urge our readers to study carefully (see Appendix 1). Among his proposals are that of changing the rules allowing the Commission to "suppress" names and to place them on lists of "suppressed" names. We fully agree that the possibility to "suppress" names should be limited to very specific cases, by making the conditions for a name to be eligible for "suppression" by the Commission much more stringent (see HOLYNSKI 1994 and Appendix 11). We want to stress here that our attitude on this question is not new and has been the attitude of many taxonomists in the past, including officers of the Commission, as shown by this quotation from a letter sent on 21 February 1975 to one of us (A. D.) by Richard V. MELVILLE (London), then Secretary of the Commission : "Au fond, le 'principe de conservation' est justifié dans des cas de noms importants, employés par beaucoup de zoologistes et autres, et surtout dans des domaines hors de la taxonomie – agriculture, eaux et forêts, médecine, biostratigraphie, etc. Mais lorsqu'il s'agit d'un groupe qui intéresse à l'heure actuelle surtout les taxonomistes, et dont les noms ne sont pas très souvent cités, la Loi de Priorité peut être appliquée normalement." This remark points to an important difference between names widely used *outside the community of taxonomists*, for which, for pragmatic reasons of communication among scientists, exceptions to the rules can be made in some cases, and names that have been used only or mostly by taxonomists, for which exceptions should not be acceptable, *even when the use of these names has been rather important*. In other words, *among taxonomists themselves*, changes of names for nomenclatural reasons should be easily accepted, as taxonomists know the reasons for such changes and should accept them with "fair play" when they are needed to correct a mistake, even when the latter was made and perpetuated by themselves.

The recent tendency for the Commission to accept to "suppress" almost all names for which "suppression" is requested by any individual zoologist (see HOLYNSKI 1994) is a strong encouragement for zoologists to deal with nomenclatural problems without care. The rules tend less and less to be considered as real *rules*, since they are more and more frequently set aside: a rule that has to be followed only when this gives the same result as if there was no rule at all (which becomes the case if all nomenclatural change due to a strict appliance of the rules is liable to be cancelled by the Commission) is no more a rule. Many examples could be given to support this claim, but, for sake of brevity, we will give only one, that of the recent "suppression" of the name *Rana trilobata* Mocquard, 1899.

The name *Rana trilobata* was given by MOCQUARD (1899: 158, fig. 1) to a frog from Mexico which was accurately described and figured. BOULENGER (1920) placed this name in the synonymy of *Rana pipiens* Schreber, 1782. Later, the name had a rather complex history (see HILLIS, FROST & FROST 1983), but it always remained attached to a frog of the *Rana pipiens* complex. On 10 March 1980, one of us (A. D.) wrote to Hobart M. SMITH (Boulder) to suggest reexamination of the holotype of this species, still present in good condition in the Paris Museum, by a specialist of this difficult group, in order to allow a proper identification of the species. This was followed by two requests of loan of this specimen, first by John S. FROST (see HILLIS,

Source : MNHN, Paris

FROST & FROST 1983), then by Robert G. WEBB (see WEBB 1991). The holotype being a young specimen, its proper identification was not easy, but the final identification, as belonging to the same species as the holotype of *Rana megapoda* Taylor, 1942 (WEBB 1991), seems now clear and undisputed. The species until then known as *Rana megapoda* has been the matter of very few publications, and replacement of its name by the senior synonym *Rana trilobata* Mocquard, 1899 would not have caused any serious nomenclatural disturbance. However, WEBB (1992) applied to the Commission to ask "suppression" of the name *Rana trilobata* in order to "protect" the name *Rana megapoda*. This request was followed by a single comment (SMITH 1993), which clearly speaks against the idea that "protection" of the recent and seldom used name *Rana megapoda* was a matter of high concern for herpetologists. Despite this poor reaction, the Commission decided to follow the request, and voted the "suppression" of the name *Rana trilobata* (ANONYMOUS 1994).

It is noteworthy that the name *Rana trilobata* cannot at all be considered to have ever been a *nomen oblitum*, "since it has been used by several authors, although always in the wrong sense, during the past 50 years" (HILLIS, FROST & FROST 1983: 74). Furthermore, the erroneous allocation of this name did not come from its being based on a short, uncomplete or inadequate description of a specimen now lost, as is the case for many old names, but to the carelessness of all authors who have worked on Mexican frogs and on American leopard frogs, who failed to examine the holotype which was publicly known (GUIBÉ 1950) to be kept in the collection of one of the major natural history Museums in the world, until the curator of this collection suggested its examination. The "well-known" name *Rana megapoda* cannot seriously be argued to be much more known than the name *Rana trilobata*: to support his claim that "*Rana megapoda* is firmly entrenched in the primary literature", WEBB (1992: 211) only quoted *two* references (SMITH & TAYLOR 1948; HILLIS, FROST & WRIGHT 1983) to the use of this name for this poorly known and little studied species of frogs, and in the first of these references, both names *Rana trilobata* and *Rana megapoda* are mentioned. It would probably be impossible to find as many references of publications where the name *Rana megapoda* appears as of papers mentioning the name *Rana trilobata*, simply because the latter is almost 50 years older and was never "forgotten" by systematists. Finally, it should be noted that, as stated by WEBB (1991: 20) himself, *Rana trilobata* and *Rana megapoda* are only *subjective* synonyms, based on different specimens from different populations: the theoretical possibility exists that, despite their morphological similarity, these populations could be later recognized as distinct species-group taxa.

As a matter of fact, in amphibians but also in many other zoological groups, recent biological works using modern techniques such as protein electrophoresis or bioacoustics have shown that species richness in these groups has long been underestimated by zoologists and is much higher than had been believed in the past. A lot of old names which had once been considered as synonyms can then be "resurrected" to designate the newly recognized species. This is much more parsimonious than creating new names for these taxa, all the more that a synonym does not "disappear" from scientific literature, but still has to be mentioned in synonymies, even if it was "suppressed" by the Commission (see several examples in DUBOIS & OHLER 1995).

To summarize the discussion above, in 1994 the Commission voted for the "suppression" of a well-known name, based on a well-known holotype kept in a major Museum, simply to protect an invalid use introduced and maintained in a small number of publications, for less than 50 years (1942-1991), by a small number of authors who had not done correctly their work.

Source : MNHN, Paris

This can hardly be argued to be an action taken for the sake of the stability and universality of nomenclature. Unfortunately, although this example may be somewhat "extreme", it is not unique. A strong tendency exists, under the pretext of protecting "usage" rather than priority, to protect the mistakes made by a few recent authors, especially those from some areas of the world. We strongly disagree with this tendency and we support HOLYNSKI's (1994) alternative approach.

Recent discussions, *e.g.* by HOLYNSKI (1994), have shown that it is impossible to give an absolute definition of "current usage", while "priority" is a simple, international and non-controversial concept. "Current usage" depends on various factors and can, for a given name, change very quickly when one factor changes (*e.g.*, a group of colleagues publishing within a short period several works using a name until then unused will make its usage become "current"). On the other hand, the concept of "priority" relies upon a single uni-directional factor, *i.e. time*: any publication date, once determined by careful bibliographic research, can unequivocally, and independently of other information, be placed and recognized as prior or posterior to another date. As in zoological nomenclature there is a starting date (1758) and stringent rules for the availability of names, the number of names is finite and, to tell the truth, in any given zoological group, rather small. It is fully misleading to claim that "bibliographic archaeologists" will "always" uncover senior synonyms of currently used names: final nomenclatural stability will be achieved when the bibliographic research work is completed, which is a finite and accessible goal. Stabilization of nomenclature by this way is a true and final stabilization, while stabilization by the bias of "Opinions" of the Commission is heavy and fragile. The same ideas can be expressed in terms of the basic principles of thermodynamics: stabilization through the use of the rules is definitive and costless, while "stabilization" through interventions of the Commission is costly in terms of energy and liable to be changed again, for example "every 20 or 30 years" (HOLYNSKI 1994: 14), as fashions and powers change within the small world of institutional zoology.

As a matter of fact, in many cases, the so-called current "common usage" is simply the use of a small group of zoologists, especially from "rich" countries which, having more funds for research, tend to publish more papers than others. We predict that, if the Commission continues to "suppress" well-known names, based on well-known holotypes kept in major Museums, simply to please a small community of persons, it will be ruining the basis of its own existence. If this tendency continues, the number of cases submitted to the Commission will grow each year and some future zoologists will be tempted to overlook completely the nomenclatural aspect of their taxonomic work: nothing is more easy for a "modern" taxonomist using "modern" techniques than to show that a new species can be recognized, *e.g.* by a study of biochemical characters, and described on the basis of these "new characters" without care for the older scientific literature, and later, after a few years of use of the new name, if another serious taxonomist points to the existence of an earlier synonym of this name, to ask for the "suppression" of the latter. Such an extreme evolution of nomenclatural practices is likely to be rejected by a significant part of the international community of zoologists, especially from countries with an old tradition of taxonomic research. We fear that, if the tendency continues for the Commission to "suppress" names quickly, without proper discussion in the international community, just to "protect the mistakes" of a few authors, this might lead to the end of the international consensus upon a single system of zoological nomenclature.

Source : MNHN, Paris

NOMENCLATURAL ROLE AND IMPORTANCE OF NAME-BEARING TYPES (ONOMATOPHORES) AND TYPE-LOCALITIES (TYPE-POPULATIONS)

It has become rather fashionable, in recent days, to express contempt for the early works of the founders of zoology, for their "incomplete" or "inaccurate" descriptions, and this attitude has been the basis for the neglect, rejection or "suppression" of many old names.

Of course, problems of allocation of names to biological taxa are more frequent and important for ancient names than for names published recently. While some descriptions and illustrations from the very first days of zoology were "already" remarkably detailed and accurate (see DUBOIS & OHLER 1995), it is true that early descriptions were often very brief and imprecise, and that type-specimens of many old names have been lost. However, this does not mean that problems regarding the allocation of these names are of a *nature* different from those concerning recent names. In all cases, the important point is the proper allocation to a biological species of the name-bearing type(s), or, if this/these has/have been destroyed or lost, of topotypical specimens. The *Code* is very clear about it: what allows the proper identification of a nominal species is not its original *description*, but its original *name-bearing type*, which in its turn refers to a *type-locality* (*i.e.* to a *natural population* of the animal species under consideration).

Despite its misleading name, the role of the name-bearing type is not to provide a "typical" specimen which should bear all "typical" characters of the species-group taxon it refers to: such a conception of type-specimens clearly refers to "the typological thinking of essentialism" (MAYR & ASHLOCK 1991: 11). It is unfortunate that the term "type" was used for a very long period (more than 150 years) and retained in the current edition of the *Code* to designate the concept of "name-bearing type". It would have been much better to use for this concept another term, such as DENNLER's (1939) term *test* or SIMPSON's (1940, 1961) term *onomatophore*, which both do not include the word "type" and therefore do not provide the "temptation" to view "name-bearing types" as "typical" specimens. However, due to the very long use of the term "type" in nomenclature, it would seem difficult to introduce such a change now.

The major role of the name-bearing type (onomatophore) is not to provide *characters* (although it can "incidentally" also do this, especially if it is the only known specimen of the species), but to provide an *objective* and *non-ambiguous* reference to a natural population of animals. In this respect, it might be better to refer to *type-populations* rather than to *type-localities*. In practice, it is true that generally the two terms are equivalent and that usually formal designation of a type-locality is a clear and non-ambiguous designation of a natural population as "name-bearing type" (or rather "onomatophore"). But there are exceptions to this general rule. For example, changes may occur in the taxonomic composition of a fauna, which sometimes can happen in short periods of time. A species may disappear from an area, or its natural range may change: it may be replaced in the type-locality by another closely related species, but still occur in other areas, etc. The "type-locality" may then refer to another animal population than that used for the original description. For these reasons, and although this would be a rather important change, we would favor the replacement, in the next edition of the *Code*, of the terms "type-locality" by the terms "type-population", or, even better although less palatable, "name-bearing population" or "onomatophoric population".

Source : MNHN, Paris

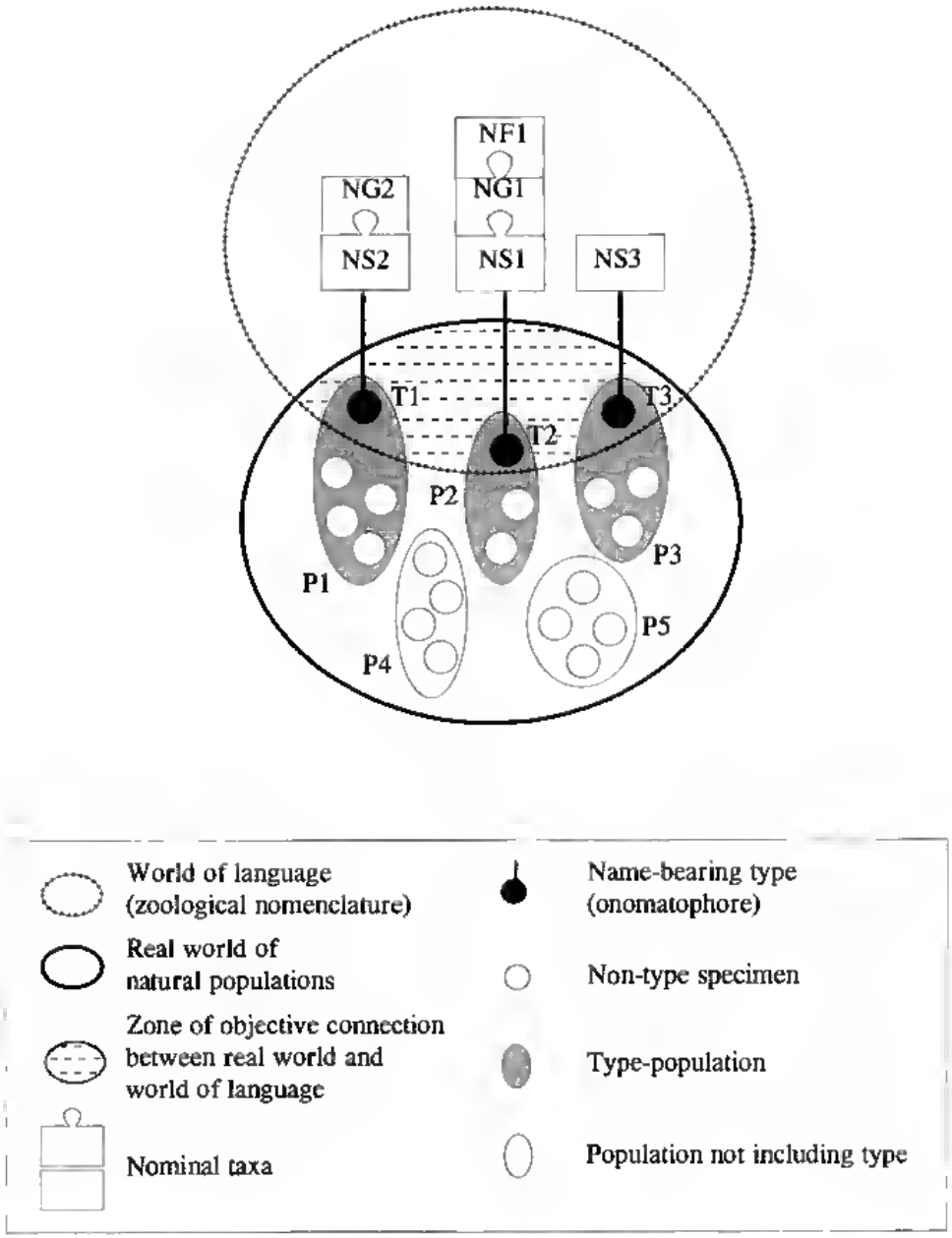


FIG. 1. — The role of name-bearing types (onomatophores) as an objective connection between the real world of natural animal populations and the world of language (zoological nomenclature). NF1, nominal family 1. NG1 and NG2, nominal genera 1 and 2. NS1 to NS3, nominal species-group taxa 1 to 3. P1 to P5, natural animal populations 1 to 5. T1 to T3, name-bearing types 1 to 3.

Source : MNHN, Paris

It is very important to stress that *species-group name-bearing types (onomatophores) are the only objective link between the real world of animals in nature and the world of language, of scientific names* (see Fig. 1). Descriptions, just as names, are part of the world of language, not of the real world of animals, while name-bearing types are real specimens. A species-group name is defined by an objective reference, through one or several type-specimens, to a natural population of animals. In contrast, all other scientific names, *i.e.* names of higher taxa, rely on name-bearing types which are names, not specimens. However, through the hierarchical structure of zoological nomenclature, they ultimately refer also to the species-group type-specimens and their type-populations (see Fig. 1).

Needless to say, in recent taxonomic works, it is important that description of species be made with as much care and accuracy as possible: this will facilitate the work of other zoologists to identify specimens and recognize species. But it should be clear that even very detailed descriptions cannot be the *basis* for nomenclatural allocation of names. Even very recent descriptions, as complete and accurate as they may be, may lack some characters which will be found only later to be of importance for the actual identification of a specimen. Let us take just one example. The North American tree-frog species *Hyla versicolor* Le Conte, 1825 and *Hyla chrysoscelis* Cope, 1880 were described on the basis of morpho-anatomical characters of adult frogs only. Later, subsequent studies showed that these species could be distinguished by other characters, including their mating calls and their ploidy levels (see *e.g.* DUBOIS 1977). Since diploid and tetraploid cells have different characteristics, it was possible to ascertain the ploidy of the name-bearing type of one of these nominal species, which had important nomenclatural consequences (for more details, see: FITZGERALD *et al.* 1981; SMITH *et al.* 1988; ANONYMOUS 1993). The same could well occur tomorrow concerning a species described today, but for which, at the time of its description, the characteristics of the mating call or the ploidy level was not known to be an important identification character.

The number of characters that can be studied and recognized in an animal is virtually endless. As our knowledge progresses, new characters are regularly discovered. Information on these characters will not be found in the descriptions, but can be obtained from *a posteriori* study of the name-bearing type(s) or of topotypical specimens or populations. Therefore the emphasis put by the *Code* on name-bearing types (and, through them, on the natural populations from which they were collected), rather than on descriptions, is excellent indeed, and is the best way to achieve the stability of nomenclature.

In conclusion, to ascertain the status of an ancient scientific name, the best and most efficient way is to study its name-bearing type (onomatophore). This requires several steps:

1, to ascertain which specimens were the original name-bearing types (holotype or syntypes), *i.e.* those on which the original description was based;

2, to ascertain if these specimens are still in existence, and where;

3, if they, or part of them, are still in existence, to study them;

4, to ascertain whether stabilization of the status of the name requires the designation of a lectotype or, in case the holotype or all syntypes have disappeared, of a neotype, and, if this is necessary, to designate and describe such a lectotype or neotype.

The purpose of the series of papers introduced here is to make this work for a number of ancient scientific names of Amphibia Anura, in order to definitively stabilize their status. Before

Source : MNHN, Paris

doing this however, it may be useful to remind some of the rules and concepts on which such a work is based, because some of them seem to be unknown or misunderstood by several recent taxonomists.

AVAILABILITY OF SCIENTIFIC NAMES

Before discussing the status and allocation of any scientific name, the first question that must be asked about it is whether this name is "available" in the very precise sense given to this term by the *Code*. To be available, a name must, of course, have been *published*, in the precise sense given also by the *Code* to this term, and accompanied by a description or indication. But this is not enough. The name must also have been published by the author as a *new name*, a name nomenclaturally created in this publication, not a name already used by previous authors and used again, sometimes under a slightly different meaning, in the publication under consideration. This may seem obvious but it is not. As a matter of fact, some recent authors tend to deal with ancient taxonomic texts as if they were contemporary texts (see BOUR & DUBOIS 1984). Nowadays, when a taxonomist uses or quotes a scientific name, he/she usually refers to the author and date of the original description of this nominal taxon. But in the old days this was far from being the case. Many authors used a name without mentioning its author and date, which were often considered to be "obvious", well-known by all cultured readers. In many other cases, they mentioned some secondary authors who had used this name but not the primary author of the name. This was common practice then, and it would be completely inappropriate to consider that, each time that a taxonomist has used a name without quoting its author, he has created a new name (which would then be a junior primary homonym of the original name).

In order to know whether an author indeed "created" a name (*i.e.* a nominal taxon) in a paper, we need some criteria. These may not be as simple to find as it would seem at first glance. For example, many ancient authors used the formulae or letters "*Mihi*" or "*M.*", or "*Nobis*", "*Nob.*" or "*N.*", to designate the new taxa that they were creating. But these formulae cannot be used as non-ambiguous evidence of the creation of a new name, for several independent reasons:

1, although these formulae were sometimes used to designate brand new taxa, they were also used to designate new combinations, new spellings, or sometimes simply a modified concept of the taxon (*e.g.* a more or less inclusive taxon, a newly defined taxon, etc.);

2, in the old days, it was frequent use for an author to describe as "new" a taxon in several distinct publications; of course, with our current rules, the taxon must be understood as new only in the first published work, and it would be completely irrelevant to consider any subsequent publication of the same name by the same author, even if followed by *mihi* or *nobis*, as a new name (and hence a junior homonym and synonym of the first published name).

Such a comment may seem to be unnecessary to many experienced taxonomists, who are well aware of this situation, and this question may appear trivial, but it is not. Many taxonomists in the past have recognized the existence of such unwarranted "junior homonyms". It is incorrect to consider that an author had created a new name when he had only modified the content or

Source : MNHN, Paris

definition of a taxon, while keeping for it the name proposed by an earlier author, even when he did not quote this author, as was often the case then.

A very recent citation will allow to underline these statements: "The description of *Hyla rubra* by LAURENTI (1768) was based on an illustration [...] in SEBA (1735). DAUDIN (1802) also used the name *Hyla rubra*, referred to SEBA's illustration [...]. DAUDIN (1802; 1803) made no reference to LAURENTI's use of the name *Hyla rubra*, so it must be assumed that DAUDIN considered his *Hyla rubra* to be a new name. Because of DAUDIN's reference to the illustration in SEBA, it seems as though both descriptions of *Hyla rubra* were of the same animal; LAURENTI's description was based solely on SEBA's illustration, whereas DAUDIN's description was based on the specimen illustrated by SEBA. Therefore, *Hyla rubra* Daudin, 1802, is a junior objective homonym (sic) of *Hyla rubra* Laurenti, 1768." (DUELLMAN & WIENS 1993: 39-40). This short citation contains an unusual amount of errors. First, it contains the curious creation of the category of "junior objective homonym", which clearly is the result of a lumping between "junior primary homonym" and "junior objective synonym". Second, if DAUDIN was indeed the author of a name *Hyla rubra*, the correct citation for this authorship would be "Daudin, 1800a", not "Daudin, 1802": actually DAUDIN used the name *Hyla rubra* twice before his 1802 book, once in his 1800a booklet and once in SONNINI & LATREILLE's 1801 book (for the respective publication dates and authorship of these works, see HARPER 1940). Third, DUMÉRIL & BIBRON (1841: 595) stated that the specimen illustrated and described by DAUDIN was *not* the specimen illustrated by SEBA, so that if it were true that DAUDIN had created a new nominal taxon, this would not be an *objective* synonym of LAURENTI's name. But finally and more importantly, this citation well exemplifies the mistake outlined above concerning junior primary homonyms. Of course, DAUDIN (1800a, 1802, 1803; and in SONNINI & LATREILLE 1801) did not create a new name, but used LAURENTI's name *Hyla rubra*, as shown by the fact that, in the synonymy of this name, he mentioned not only SEBA's (1735) plate, but also DAUBENTON's (1782: 668) and LACÉPÈDE's (1788: 327) works, who both clearly referred to LAURENTI's (1768) description. It is important to underline such an error, because, if the same line of reasoning was to be generalized among taxonomists, we would suddenly have to recognize hundreds, thousands or even millions of such "junior objective homonyms".

This does not mean that junior primary homonyms were not created in these old days. But we need some criteria to recognize them. For reasons outlined above, absence of citation of the original author and date of a name cannot be such a criterion, nor can the use of formulae like *mihi* or *nobis*. Three major citeria can be pointed out:

C1, when an author states in full words that he is creating a new name for a new taxon;

C2, when he states in full words that the name he is using is the same as the name used by a previous author, but that he uses it with a different meaning, for another taxon;

C3, when the ancient name N is quoted in the synonymy of a name A, but, in the same work, the same name N is applied as valid to another taxon.

Case C1 is very widespread and does not need to be exemplified. An example of case C2 is provided by DAUDIN (in SONNINI & LATREILLE 1801: 154), who wrote, in the text under the name *Rana pipiens*: "Il ne faut pas rapporter à cette espèce le *rana pipiens* de Schreber, qui est le synonyme de la grenouille criarde." In other words, DAUDIN in this text considered the name *Rana pipiens* Schreber, 1782 as a synonym of his *Rana clamitans* ("grenouille criarde"),

Source : MNHN, Paris

but he used the name *Rana pipiens* for another species, thus creating a junior primary homonym. Finally, an example of case C3 is provided by DAUDIN (1802: 29-30) who included the name *Hyla lactea* Laurenti, 1768 in the synonymy of his *Hyla hypocondrialis*, but used the name *Hyla lactea* for another distinct species, which he had already described earlier (DAUDIN 1800b: 19): in this case the name *Hyla lactea* Daudin, 1800b (not "1803" or "1802", as written in error respectively by DUELLMAN & LYNCH 1981 and by FROST 1985), is indeed a distinct nominal species, which is a junior primary homonym of *Hyla lactea* Laurenti, 1768.

DISTINCTION BETWEEN DIFFERENT KINDS OF NAMES OR SPELLINGS

Once a scientific name has been published, it can be used again by other authors. As a rule, ancient authors used names without changing them, but in some cases, and rather often in older times of taxonomy, they modified their spelling, and sometimes they even replaced a name by a different, new name, for the same taxon. In order to correctly deal with nomenclatural problems, it is very important to distinguish between the following categories of new names and spellings: new replacement names, justified and unjustified emendations, incorrect subsequent spellings. One of us has already devoted a long and detailed discussion to this question (DUBOIS 1987: 31-48), to which we refer our readers: this paper contains in particular proposals of criteria to distinguish the various categories of names and spellings, illustrated by many examples.

THREE CATEGORIES OF SYNTYPES

As already mentioned above, in many cases the best (or only) way to stabilize the status of an ancient species-group name is through the study of its original name-bearing type: this may be either a single specimen (the *holotype*) or a series of specimens (the *syntypes*); in the latter case, any subsequent author is entitled to designate among them a *lectotype*, which becomes then the unique name-bearing type (the other syntypes then become paralectotypes and lose their status of name-bearing types). In many cases, the name-bearing types of ancient nominal species have been lost or destroyed and are not available for study. In such cases, the *Code* allows for the possibility, if this is necessary to clarify and stabilize the status of a nominal taxon, to designate a *neotype* for it. The latter should come from the original type-locality or very close to it. Fig. 2 gives diagrammatic representations of the various kinds of name-bearing types and the relationships they imply between natural populations and nominal species-group taxa.

Which specimens are the syntypes of a nominal taxon? In many ancient publications, the author of a new name did not clearly state which specimens he considered to be the syntypes of the new nominal taxon, and this must be reconstructed a posteriori through the help of external evidence (Recommendation 72B of the *Code*). According to the *Code*, the original type-series of a nominal species-group taxon can be composed:

Source : MNHN, Paris

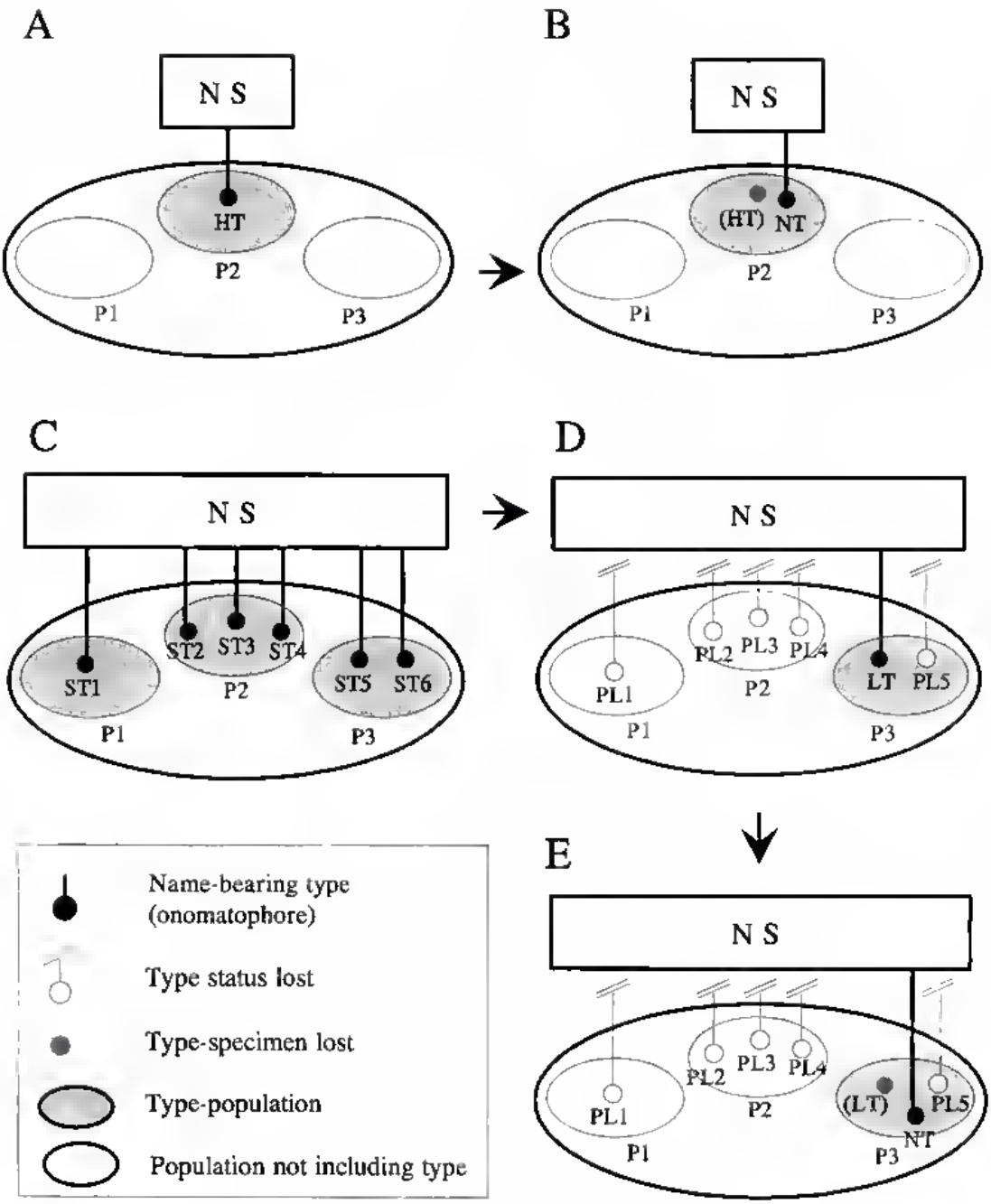


FIG. 2. — Different kinds of name-bearing types (onomatophores) in zoology. HT, holotype. LT, lectotype. NS, nominal species. NT, neotype. P1 to P3, natural animal populations 1 to 3. PL1 to PL5, paralectotypes 1 to 5. ST1 to ST6, syntypes 1 to 6. A, designation of a *holotype* (HT) in the original description of a species-group taxon gives an objective and non-ambiguous reference to a single natural population of animals as "type-population". B, if the holotype is lost or destroyed, a *neotype* (NT) may be described, but it should come from the same population as the holotype (or from a population as close as possible to the latter). C, in case of description of a species-group taxon based on several specimens without designation of a holotype, all these specimens are *syntypes* (ST) and they collectively bear the name. All the populations where these specimens were collected share the status of type-populations. D, designation among the syntypes of a *lectotype* (LT) definitively *suppresses* the status of name-bearing types of all other syntypes, which become *paralectotypes* (PL) and lose permanently their nomenclatural function regarding the species-group name concerned. This restriction also serves as a restriction of the type-population to the population from which the lectotype was collected. E, if the lectotype is lost or destroyed, a *neotype* may be chosen, but here also it must come from the same population as did the lectotype. The neotype may be either one of the remaining paralectotypes or another specimen (even if some of the paralectotypes are still in existence).

Source : MNHN, Paris

1, either of specimens which had been examined, described and/or illustrated by the author himself;

2, or of specimens which were not available to him but which had been examined, described and/or illustrated by a previous author, in a work explicitly referred to in the original description;

3, or both.

In this respect, we think that matters will be made clearer by introducing here a distinction between three categories of syntypes:

1, we call *primary syntypes* of a nominal species-group taxon T the specimens which had been examined, described and/or illustrated by the author A of the original description D him/herself;

2, we call *secondary syntypes* the specimens which had not been examined, described and/or illustrated by the author A, but by a previous author B in an earlier work W quoted in the original description D as a basis for the new taxon T;

3, we call *tertiary syntypes* specimens which had been examined by neither authors A and B, but by a still earlier author C, quoted by author B in the work W quoted by A in the original description D of the new taxon T.

To make these definitions clearer and to illustrate in detail these three categories, we have devoted the second paper of this series (DUBOIS & OHLER 1996) to a thorough analysis of the status of the syntypes of the species *Rana arborea* Linnaeus, 1758.

Finally, we want to stress that all specimens listed in the original description of a nominal species are not always syntypes. Article 72(b) of the *Code* gives important particulars about the criteria to be used to ascertain which specimens are and are not syntypes. Particularly important is the following statement in Article 72(b)(i): "The type series of a nominal species-group taxon consists of all the specimens eligible to be name-bearing types (...) included by the author in the new nominal taxon, except any that the author expressly excludes from the type series (...), or refers to as distinct variants (*e.g.*, by name, letter, or number), or doubtfully attributes to the taxon." Therefore, specimens for which the author of a new nominal taxon expresses doubts concerning their allocation to the taxon are *not* syntypes, and the same applies to specimens referred in the original description to particular varieties (under indications such as: "var.", "var. ß", "var. B", etc.). This rule has been overlooked by several recent authors, as we will see in the following papers of this series.

LECTOTYPE DESIGNATIONS FOR SPECIES DESCRIBED IN ANCIENT TAXONOMIC LITERATURE

A special, but not uncommon, situation exists when only some of the original syntypes of a nominal species-group taxon are still in existence, the other ones having been lost. This is for example the case of many of the species described by LINNAEUS (1758, 1761, 1766, 1767). Should the subsequent authors feel then obliged to choose a lectotype among the remaining syntypes? This is what a vast majority of authors until now have felt obliged to do, although the *Code* does not at all require to do so. It is *wrong*, within the frame of the current *Code*, to state that the fact that some (or all) of the original syntypes of a nominal species have been lost or destroyed prevents from the possibility to designate one of them as lectotype. This is

Source : MNHN, Paris

underlined by Articles 72(c)(v) and 74(c) of the *Code*, which state that designation as lectotype of a specimen described or illustrated in an old work is valid, even if this specimen cannot be traced now. This designation must be understood as designation as name-bearing type of the specimen illustrated or described, "not the illustration or the description".

For old names which pose problems of allocation to biological species, this procedure has very strong advantages, which have not been clearly pointed out by previous authors. Let us make them clear by using a precise example, taken from our recent work on European green frogs (DUBOIS & OHLER 1995).

LINNAEUS (1758: 212) described *Rana esculenta* without stating the number and origin of specimens he had before him. The type-locality he gave for this species was very vague: "Habitat in *Europae* fontibus". If we only had this information, the name *esculenta* could be available for any of the European green frogs. Furthermore, according to LÖNNBERG (1896) and ANDERSSON (1900), the only original type-specimen of this species still in existence would appear to belong to the brown frog species now known as *Rana arvalis* Nilsson, 1842 (see LONNBERG 1896: 35)! Designation of the latter specimen as lectotype of *Rana esculenta* would have dramatic nomenclatural consequences. Fortunately, the current *Code* does not oblige us to do this. In the original description of *Rana esculenta*, LINNAEUS (1758: 212) made clear reference to ROESEL VON ROSENHOF's (1758) description and figures of "*Rana viridis aquaticae*". Therefore, the specimens used by ROESEL VON ROSENHOF for his text and figures must also be considered (secondary) syntypes of *Rana esculenta*. Designation of one of the figured or described specimens as lectotype of this species (DUBOIS & OHLER 1995) is valid under the current *Code*. These rules have the following nomenclatural consequences in this case:

1, by the designation as lectotype of *Rana esculenta* of one of the specimens figured by ROESEL VON ROSENHOF (1758), all other syntypes of this nominal species (including the "*Rana arvalis*" specimen) immediately and definitively lose their status of syntypes and cannot any more threaten the stability of nomenclature;

2, the type-locality of *Rana esculenta*, which was "Europe" before this designation, becomes definitively restricted to the locality where the figured specimen had been collected (Nürnberg, Germany);

3, many external morphological and color characters of this specimen can be seen on this figure, which in this case allows a non-ambiguous allocation of the name (furthermore, the text gives detailed information on the developmental biology of these frogs which confirms the identification).

Now, let us go further and suppose that the figure does not provide enough information for an unequivocal allocation of the name, and that the illustrated specimen cannot be traced now. It would then be possible to claim that we are in a case where the circumstances allow the designation of a neotype (Article 75 of the *Code*), and this designation can be made in a last step (4). But it cannot be made anyhow: the neotype must come from the restricted type-locality or as close to it as practicable (Article 75(d)(5) of the *Code*).

This process can therefore be described more generally as follows. The designation as lectotype of a figured or described but lost specimen can play the roles (1) and (2) above: "elimination" of all other syntypes and fixation of the type-locality. In a step (3), close examination of the figure and/or description may be enough to stabilize the status of the name. If not, in a

Source : MNHN, Paris

step (4), designation of a neotype from the restricted type-locality may be necessary to complete the work of fixation of the status of a name.

We think that this process, which is described in detail here for the first time, is liable to solve many, if not almost all, cases of old names without proper allocation to biological species. We illustrate this process in full detail in our second paper of this series (DUBOIS & OHLER 1996), and, in subsequent papers of this series, we will use it more rapidly, as we think its principles will have been clarified.

The three categories of syntypes recognized above have, in our view, different status regarding their possible choice as lectotypes. Of course, still extant primary syntypes, which are known to have been in the hands of the author when he described the new species, and which are still kept in a Museum collection, should be preferred for lectotype designation when their choice does not raise nomenclatural problems. But in some cases, as exemplified for the names *Rana esculenta* (DUBOIS & OHLER 1995) or *Rana arborea* (DUBOIS & OHLER 1996), choice of a still extant primary syntype as lectotype would lead to dramatic nomenclatural consequences. In such cases, it may be better to choose a secondary syntype, which was not (or may not have been) seen by the author of the name, but which was described or figured in a publication seen by him/her. Only in extreme situations, when both primary and secondary syntypes do not belong to the biological species currently known under the name under consideration, and when change of this name would have disastrous consequences, should a tertiary syntype be chosen as lectotype.

Finally, it should be stressed that the choice of a lectotype should be made after a careful analysis of the nomenclatural situation of the name considered. As underlined above, not all "old names" are "well-known". Some, like *Rana temporaria* Linnaeus, 1758, are, while others, sometimes appearing in the same ancient publication, such as *Rana hyla* Linnaeus, 1758 (see DUBOIS & OHLER 1996), are not. The treatment of these two kinds of names should be different. While for "well-known" names it is important to do the best to stabilize the use of the name in its current, usual, or more common, sense, the same is not true for names which have been almost or completely forgotten for dozens of years or for centuries. Allocation of the latter names to biological taxa, through lectotype designation, should be done, if possible, in order not to disturb the current nomenclature of the group where they belong. Therefore, if possible, in the case of a "well-known" old name, designation of a lectotype (or, if necessary, of a neotype) should be done in order to maintain the current use of the name, while in the case of an "obscure" old name, it should be done in order to lead to the disappearance of this name as a junior objective or subjective synonym. A junior objective synonym will remain permanently invalid, but a junior subjective synonym is liable, in some cases, to be resurrected as the taxonomy of a group progresses and more species-group taxa have to be recognized.

TYPE-LOCALITY RESTRICTIONS

According to Article 72(h) of the *Code*, the type-locality of a nominal species or subspecies is the geographical place of capture or collection of its name-bearing type. When a species was described from several syntypes from distinct localities, restriction of the type-locality to one

Source : MNHN, Paris

of these localities can be obtained only through the designation of a lectotype among them, or of a neotype if all original syntypes have been destroyed or lost (see Fig. 2). So-called "restrictions of type-localities", not accompanied by formal designations of lectotypes or neotypes, are invalid according to the *Code*. Many such invalid "restrictions" have been done by various authors in the past. In many cases, it is possible to "make them valid a posteriori" through the designation of a lectotype or of a neotype, and we think that, for the sake of stability, this should be done as much as possible. But in some other cases, this is not possible, and type-localities will have to be corrected in order to fit with the lectotype or neotype designation.

RELATIVE PRIORITY BETWEEN NAMES PUBLISHED SIMULTANEOUSLY

This will be the last comment of this introductory paper. Not infrequently, several scientific names published simultaneously, either by the same or by different authors, are later considered to apply to a single biological taxon. In such cases, according to the *Code*, the valid name among them is determined by the action of the "first reviser", *i.e.* the first author to have quoted both names and chosen the order of priority between them. Such first reviser actions may be difficult to trace, especially as concerns old names. In the subsequent papers of this series, we will try to trace all such actions concerning the names discussed, and furthermore, in order to avoid similar problems in the future, we will take such first reviser actions in all cases when they have not been done yet.

REFERENCES

ANONYMOUS, 1961. — *International Code of Zoological Nomenclature*. First edition. London, International Trust for zoological Nomenclature: i-xviii + 1-176.

— 1964. — *International Code of Zoological Nomenclature*. Second edition. London, International Trust for zoological Nomenclature: i-xx + 1-176.

— 1985. — *International Code of Zoological Nomenclature*. Third edition. London, International Trust for zoological Nomenclature: i-xx + 1-338.

— 1993. — Opinion 1716. *Hyla chrysoscelis* Cope, 1880 (Amphibia, Anura): specific name conserved by the designation of a neotype. *Bull. zool. Nom.* **50** (1): 94-95.

— 1994. — Opinion 1776. *Rana megapoda* Taylor, 1942 (Amphibia, Anura): specific name conserved. *Bull. zool. Nom.* **51** (2): 181.

ANDERSSON L. G., 1900. — Catalogue of Linnean type-specimens of Linnaeus's Reptilia in the Royal Museum in Stockholm. *Bihang K. Svenska Vet.-Akad. Handlingar* **26** (4): 1-29.

BÖHME W. & WIEDL H., 1994. — Status and zoogeography of the herpetofauna of Cyprus, with taxonomic and natural history notes on selected species (genera *Rana*, *Coluber*, *Natrix*, *Vipera*). *Zool. Middle East* **10**: 31-52.

BOULENGER G. A., 1920. — A monograph of the American frogs of the genus *Rana*. *Proc. amer. Acad. Arts Sci.* **55**: 413-480.

BOUR R. & DUBOIS A., 1984. — Nomenclatural availability of *Testudo coriacea* Vandelli, 1761: a case against a rigid application of the Rules to old, well-known zoological words. *J. Herpet.* **17**: 356-361.

DAUBENTON M., 1782. — Les animaux quadrupèdes ovipares, et les serpens. *In Encyclopédie méthodique – Histoire naturelle des animaux*, Tome premier, Paris, Panckoucke : 545-712.

Source : MNHN, Paris

DAUDIN F. M., 1800a. — *Histoire naturelle des quadrupèdes ovipares*. Livraison 1. Paris, Fuchs, Delalain, Treuttel & Würtz : [1-11], pl. [I-VI].

— 1800b. — *Histoire naturelle des quadrupèdes ovipares*. Livraison 2. Paris, Fuchs, Delalain, Treuttel & Würtz : [13-24], pl. [VII-XII].

— 1802. — *Histoire naturelle des rainettes, des grenouilles et des crapauds*. Paris, Levrault : 1-108, pl. I-XXXVIII.

— 1803. — *Histoire naturelle, générale et particulière des Reptiles* Tome huitième. Paris, Dufart : 1-439, 8 pl.

DENNLER J. G., 1939. — La importancia de la distribución geográfica en la sistemática de los vertebrados. *Physis* **16**: 41-53, pl. I-VIII.

DUBOIS A., 1977. — Les problèmes de l'espèce chez les Amphibiens Anoures. *Mém. Soc. zool. France* **39** : 161-284.

— 1981. — Liste des genres et sous-genres nominaux de Ranoidea (Amphibiens Anoures) du monde, avec identification de leurs espèces-types : conséquences nomenclaturales. *Monit. zool. ital.*, (n. s.) **15**, suppl. : 225-284.

— 1984. — La nomenclature supragénérique des Amphibiens Anoures. *Mém. Mus. natl Hist. nat.*, (A) **131** : 1-64.

— 1987. — Again on the nomenclature of frogs. *Alytes* **6**: 27-55.

— 1994. — Comment on the proposed conservation of Hemidactyliini Hallowell, 1856 (Amphibia, Caudata). *Bull. zool. Nom.* **51**: 264-265.

— 1995a. — Discussion Draft of the Fourth Edition of the *International Code of Zoological Nomenclature*: comments. (3). *Bull. zool. Nom.* **52**: 299.

— 1995b. — Comments on the proposed conservation of Hemidactyliini Hallowell, 1856 (Amphibia, Caudata). *Bull. zool. Nom.* **52**: 337-338.

DUBOIS A., BOUR R., BRYGOO E.-R., LESCURE J., BOUCHET P. & TILLIER S., 1988. — Comments on the proposed suppression for nomenclature of three works by R.W. Wells and C.R. Wellington. (2). *Bull. zool. Nom.* **45**: 146-149.

DUBOIS A. & OHLER A., 1995. — Frogs of the subgenus *Pelophylax* (Amphibia, Anura, genus *Rana*): a catalogue of available and valid scientific names, with comments on name-bearing types, complete synonymies, proposed common names, and maps showing all type localities. *Zool. Polon.* (1994) **39** (3-4): 139-204.

— 1996. — Early scientific names of Amphibia Anura. II. An exemplary case: *Rana arborea* Linnaeus, 1758. *Bull. Mus. natl Hist. nat.*, 4e sér., A **18** (3-4): 321-340.

DUELLMAN W. E. & LYNCH J. D., 1981. — Nomenclatural resolution of the identities of *Hyla aurantiaca* and *Hyla lactea*. *J. Herpet.* **15**: 237-239.

DUELLMAN W. E. & WIENS J. J., 1993. — Hylid frogs of the genus *Scinax* Wagler, 1830, in Amazonian Ecuador and Peru. *Occ. Pap. Mus. nat. Hist. Univ. Kansas* **153**: 1-57.

DUMÉRIL A.-M.-C. & BIBRON G., 1841. — *Erpétologie générale ou histoire naturelle complète des Reptiles*. Tome 8. Paris, Roret : i-vii + 1-792.

FITZGERALD K. V., SMITH H. M. & GUILLETTE L. J. Jr., 1981. — Nomenclature of the diploid species of the diploid-tetraploid *Hyla versicolor* complex. *J. Herpet.* **15** (3): 356-360.

FROST D. R. (ed.), 1985. — *Amphibian species of the world*. Lawrence, Allen Press & Assoc. Syst. Coll.: [i-iv] + i-v + 1-732.

GUIBÉ J., 1950. — *Catalogue des types d'amphibiens du Muséum national d'Histoire naturelle* Paris, Imprimerie nationale : 1-71.

HAMMOND P., 1992. — Species inventory. *In* B. GROOMBRIDGE (ed.). *Global biodiversity – Status of the earth living resources*. London, Chapman & Hall: 17-39.

HARPER F., 1940. — Some works of Bartram, Daudin, Latreille, and Sonnini, and their bearing upon North American herpetological nomenclature. *Amer. Midl. Nat.* **23** (3): 692-723.

HILLIS D. M., FROST D. R. & FROST J. S., 1983. — Allocation and distribution of *Rana trilobata* Mocquard *J. Herpet.* **17** (1): 73-75.

HILLIS D. M., FROST J. S. & WRIGHT D. A., 1983. — Phylogeny and biogeography of the *Rana pipiens* complex: a biochemical evaluation. *Syst. Zool.* **32** (2): 132-143.

HOLYNSKI R. B., 1994. — Structure and function or: what kind of nomenclatural regulations do we need? *Crystal*, Göd, Hungary, (ser. Zool.) 2: 1-50.

Source : MNHN, Paris

LACÉPÈDE [B. G. E.] DE, 1788. — *Histoire naturelle des quadrupèdes ovipares et des serpens.* Vol. II, 16 cm. Paris, Hôtel de Thou : [i-iv] + 1-464, pl. I-XV.

LAURENTI J. N., 1768. — *Specimen medicum, exhibens synopsin Reptilium emendatam cum experimentis circa venena et antidota Reptilium austriacorum.* Viennae, Joan. Thom. Nob. de Trattnern: i-ii + 1-215, pl. I-V.

LINNAEUS C. A., 1758. — *Systema Naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis.* Editio decima, reformata. Tomus I. Holmiae: *i*-iv + 1-824.

— 1761. — *Fauna Suecica.* Editio altera, auctior. Stocholmiae, Laurentii Salvii: [i-xl] + 1-579, pl. I-II.

— 1766. — *Systema Naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis.* Editio duodecima, reformata. Tomus I, Pars I. Holmiae, Laurentii Salvii: 1-532.

— 1767. — *Systema Naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis.* Editio duodecima, reformata. Tomus I, Pars II. Holmiae, Laurentii Salvii: 533-1327 + [i-xxxvii].

LÖNNBERG E., 1896. — Linnean type-specimens of birds, reptiles, batrachians and fishes in the Zoological Museum of the R. University in Upsala. *Bihang K. Svenska Vet.-Akad. Handlingar* **22** (4): 1-45.

MAYR E. & ASHLOCK P. D., 1991. — *Principles of systematic zoology.* Second edition. New York, McGraw-Hill: *i*-xx + 1-475.

MOCQUARD F., 1899. — Reptiles et batraciens recueillis au Mexique par M. Léon Diguet en 1896 et 1897. *Bull. Soc. philom. Paris* (9) **1** : 154-169, pl. I.

ROESEL VON ROSENHOF A. I., 1758. — *Historia naturalis ranarum nostratium.* Nürnberg, Johann Joseph Fleischmann: [*i*-viii] + i-viii + 1-116, pl. 1-XXIV + frontispiece.

SEBA A., 1735. — *Locupletissimi rerum naturalium Thesauri accurata descriptio, et iconibus artificiosissimis expressio, per universam physices historiam.* Tomus II. Amstelaedami, Janssonio-Waesbergios, Wetstenium & Smith: [i-xxxiv] + 1-154, pl. 1-CXIV.

SIMPSON G. G., 1940. — Types in modern taxonomy. *Amer. J. Sci.* **238**: 413-431.

— 1961. — *Principles of animal taxonomy.* New York, Columbia Univ. Press: *i*-xii + 1-247.

SMITH H. M., 1993. — Comment on the proposed conservation of the specific name of *Rana megapoda* Taylor, 1942 (Amphibia, Anura). *Bull. zool. Nom.* **50** (1): 57-58.

SMITH H. M., FITZGERALD K. V. & GUILLETTE L. J. Jr., 1988. — Case 2366. *Hyla chrysocelis* Johnson, 1961 (Amphibia, Anura): proposed conservation and designation of a neotype. *Bull. zool. Nom.* **45** (2): 138-140.

SMITH H. M. & TAYLOR E. H., 1948. — An annotated checklist and key to the Amphibia of Mexico. *Bull. U. S. nat Mus* **194**: i-iv + 1-118.

SMITH H. B. & WAKE D. B., 1993. — Case 2869. Hemidactyliini Hallowell, 1856 (Amphibia, Caudata): proposed conservation. *Bull. zool. Nom.* **50**: 129-132.

— 1994. — Comment on the proposed conservation of Hemidactyliini Hallowell, 1856 (Amphibia, Caudata). *Bull. zool. Nom.* **51**: 341-342.

— 1995. — Comment on the proposed conservation of Hemidactyliini Hallowell, 1856 (Amphibia, Caudata). *Bull. zool. Nom.* **53**: 48-49.

SONNINI C. S. & LATREILLE P. A., 1801. — *Histoire naturelle des reptiles.* Tome II. Paris, Deterville : [i-iii] + 1-332, 19 pl.

WAKE D. B., 1993. — Phylogenetic and taxonomic issues relating to salamanders of the family Plethodontidae. *Herpetologica* **49**: 229-237.

WEBB R. G., 1991. — The identity of *Rana trilobata* Mocquard (Anura: Ranidae). *Herpetologica* **47** (1): 13-21.

— 1992. — Case 2821. *Rana megapoda* Taylor, 1942 (Amphibia, Anura): proposed conservation of the specific name. *Bull. zool. Nom.* **49** (3): 211-212.

Source : MNHN, Paris

APPENDIX I

In the paper above, we made several references to a paper by HOLYNSKI (1994), which in our view is a major contribution to the current international discussion on the *Code*, and in particular on the problem of "usage versus priority". Clearly the author of this paper does not share the ideas which are accepted by most current members of the Commission, and, although this paper was submitted in February 1991 to the Commission's Secretary for publication in the *Bulletin of zoological Nomenclature*, it was never published in this journal, without any answer or explanation from the Commission's Secretary. Finally this paper was published in the Hungarian journal *Crystal*. Unfortunately, this recent journal still does not have a large distribution worldwide, and many colleagues may find difficult to trace a copy of it. We suggest that interested colleagues order a copy of this paper by writing at the following address: Natural Science Foundation, Göd, Körös u. 15, 2131, Hungary. It would be useful if a major zoological journal with large distribution worldwide decided to publish a complete reprint of this long paper, or, better than nothing, important extracts from it. We provide below a copy of the Introduction of this very stimulating paper:

"The goal of the *International Code of Zoological Nomenclature* is – among others – stability of nomenclature. In my opinion, the *Code* acquits itself of this very difficult task surprisingly well: except for some taxonomically neglected groups the nomenclature is remarkably stable, the rate of formal (*i.e.* not caused by taxonomical rearrangements) changes of names remains within few percents in a century! This splendid efficiency of the *Code* (together with its comprehensively tested capability to make nomenclatural decisions easy and unequivocal; its 'automatic action', rendering any time-bureaucracy unnecessary; and – last not least – profoundly fair, democratic character of its guiding principle, the Principle of Priority) seems to provide a very strong argument for letting it work. Of course, nothing in this world is absolutely perfect, so some modifications of the *Code*, as well as some exceptions from its rulings, are sometimes warranted, but one would expect the modifications to be directed towards making the decisions still more automatic, unequivocal and fair, and the exceptions limited to very rare cases of obvious inevitability. To my great surprise, the opposite tendency dominates: many authors make repeated efforts to upset the *Code*, or at least to obscure its regulations by introducing innumerable abrogations – setting aside validly designated types, changing dates of publication, 'protecting' some names, invalidating others, etc.; what is 'in principle' a perspicuous, logical system, becomes impenetrable jungle of exceptions and special cases! On the following pages I wish to present more detailed comments on some – in my opinion especially dangerous – recent proposals, discuss main general aspects of nomenclatural regulations, and, at last, suggest several minor modifications which, in my intention, should further improve the above-mentioned merits of the *Code*." (HOLYNSKI 1994: 4).

Source : MNHN, Paris

APPENDIX II

In the paper above, we suggest that some conditions be necessary for a name to be eligible for "protection" by the Commission. We have already made specific suggestions in this respect, first in a letter sent on 9 April 1991 by one of us (A. D.) to Otto KRAUS (Hamburg), President of the Commission, letter to which no answer on this point was given, and then in a paper sent on 23 June 1994 to the secretariat of the Commission, of which only a brief abstract has been published in the *Bulletin of zoological Nomenclature* (DUBOIS 1995b), and which is reproduced below as it was submitted.

Proposals concerning the conditions needed for a name being eligible for conservation

by Alain DUBOIS

Abstract. — New proposals are made concerning the conditions given in Article 79 for a name being eligible for conservation: 1, the forgotten senior synonym recently rediscovered should not have been used by a *single author* during a *50-year period* before the date of publication of its "rediscovery"; 2, during the same period, the junior synonym should have been used by *at least 25 independent authors* and in *at least 100 publications*. A working definition of "independent authors" is provided. Other proposals are briefly discussed.

1. One of the basic principles of the *Code* is the rule of priority. Its consistent use for roughly a century by almost all zoologists has had a considerable impact on zoological nomenclature: in the overwhelming majority of cases, use of this rule has had the effect of stabilizing nomenclature in the whole world. This basic rule therefore answers the major aims of the *Code*, *i.e.* to ensure the universality and stability of zoological nomenclature. It is therefore beyond all doubts that this rule should be maintained.

2. However, as pointed out, especially in the recent years, by various authors, in some cases the "rediscovery" of a long "forgotten" name (simply forgotten, in most cases, because subsequent authors have not done their work properly), may in some cases have a real disrupting effect on zoological nomenclature. As was very aptly discussed recently by HOLYNSKI (1994), the importance of this risk has been greatly overstressed by several recent authors, those who are in favor of replacing the rule of priority by a "rule of usage". My aim in this paper is not to discuss in detail the idea of such a "rule of usage", which has been done already by many others (*e.g.* recently: NG 1991; HOLYNSKI 1994): in my opinion, such a rule would have so many drawbacks that it cannot seriously challenge the rule of priority; if it were to replace the latter in the next edition of the *Code*, no doubt this would cause major problems regarding the current international consensus of zoologists to follow the *Code* and to recognize the competence of the Commission in nomenclatural matters. My aim here is only to discuss the following ques-

Source : MNHN, Paris

tion: when can we seriously consider that the rediscovery of a "forgotten" name causes genuine problems of stability in zoological nomenclature? In other words, what is the meaning of the word "stability"?

3. In the *Code* currently in force, the following conditions are given (Art. 79) for a name to be eligible for conservation by the Commission, through use of the Plenary Powers: the forgotten name must not have been used by a single author as a valid name during the 50 years immediately preceding the request for action of the Commission; during the same period, the junior synonym must have been used as a valid name by at least 5 different authors and in at least 10 publications.

4. In my opinion, these rules are far too latitudinarian. In the recent years, on the basis of these rules, the number of names submitted to the Commission for conservation has been regularly progressing, and it will continue doing so in the future if these rules are maintained. In fact, suppression of earlier synonyms and conservation of junior synonyms constitute a large proportion of cases dealt with by the Commission and of pages published in the *Bulletin of zoological Nomenclature*. As remarked by HOLYNSKI (1994), in the overwhelming majority of these cases, once a name has been submitted for conservation to the Commission and the application put to vote, the Commission follows this suggestion, and uses its Plenary Powers to suppress an older synonym.

5. I fully agree that a name that has obtained *general acceptance* among zoologists, *i.e.* that has been used by many of them in many publications and during a long period, should be liable to be considered for protection, through use of the Commission's Plenary Powers to suppress a recently "rediscovered" "forgotten" name. Such a need is particularly clear for animal species that have been the matter of very numerous scientific publications, including most species of domestic animals, species widely used in experimental biology, often studied in population biology, etc. However, I am strongly opposed to consider as *widely used and of general acceptance* a name mentioned by a few dozens authors in a few dozens publications and during a few dozens years, especially when these authors are taxonomists and when the name has never or almost never appeared in non-taxonomic literature (publications in other fields of biology, popular literature, etc.). Let us discuss separately these four aspects (numbers of authors and of publications, kinds of publications, period).

6. Considering the number of authors, I feel that the number of authors having used the junior synonym should be *at least 25*, if not 50. Furthermore, I suggest to add the following qualification: "at least 25 *independent* authors". This suggested rule is meant to address the fact that authors who are working together, in a single research team or laboratory, or as collaborators from different units, are likely to adopt a single nomenclature for the animals they study: if this research team is numerous, prolific or financially healthy, it will tend to publish numerous papers on these animals, and the local nomenclatural uses or habits of this team may tend to be presented as the "common usage" of all zoologists, which may be wrong. Of course, there would be no point in trying to track down research teams by administrative or police methods, and we need an objective criterion to identify non-independent authors. I suggest to use co-authorship of published papers: for the purpose of this problem, any couple or team of authors who have co-signed

Source : MNHN, Paris

at least one paper on an animal group should be considered as a single independent unit regarding the nomenclature of this group, and this unit should appear only once in the minimum list of 25 independent authors. Therefore, "independent authors" in this context will only refer to authors who never published together on this group before the application to the Commission. Zoologists submitting such an application should be invited to follow this rule; in case they ignored it, any other zoologist would be entitled to point to publications that show that some of the authors of the list submitted were not "independent" in the sense of this proposed ruling, which would reduce accordingly the number of authors in support of the application.

7. The next criterion is the number of publications using the invalid junior synonym. I suggest to raise this number to 100. In contrast to the preceding suggested rule, this allows to take into account several publications of a single research team. But here again I suggest to add an important qualification: this should include only publications that appeared *before the date of publication of the "rediscovery" of the "forgotten" senior synonym.* This is of course to avoid that "current usage" be deliberately *rigged or manipulated* in order to support one's interpretation.

8. Finally, as concerns duration of the period during which: 1, the senior synonym has not been used by *a single author* and 2, the junior synonym has been used by various authors, I suggest to keep the number of 50 years, but, here also, to add the qualification *before the date of publication of the "rediscovery" of the "forgotten" senior synonym.*

9. The numbers suggested above (25 independent authors, 100 publications, 50 years) seem to me to be minimum values for the phrases "current usage" and "nomenclatural stability" to have a real meaning. These figures might even have to be increased in some cases, if a distinction was to be introduced between different kinds of names: for example, one might consider having these figures for species-group names, but higher figures for genus-group names (*e.g.* 50 independent authors, 200 publications, 50 years) and still higher figures for family-group names (*e.g.* 100 independent authors, 500 publications, 50 years). Another distinction might be worth considering: that between taxonomic and non-taxonomic publications. When a name has been used only or almost only in taxonomic publications, the only biologists that are really acquainted with this name are taxonomists. If discovery of a senior "overlooked" synonym occurs, all taxonomists can understand the reason why the junior name must be replaced by the senior one, and no real disturbance of their work follows this change. Of course, the disturbance may be real when non-taxonomists are at stake. For this reason, it might be good to consider only non-taxonomic publications among the 100 publications to be produced to demonstrate the existence of a real current usage. This number will be easy to reach in many cases for species that have a real economic value and importance, much less so for species that until now have interested only taxonomists: but in the latter case "fair play" should be enough to accept the rare changes which are from time to time necessary because of the "rediscovery" of "forgotten" names.

10. At any rate, I suggest that names not meeting the above minimum requirements should not even be considered by the Commission for protection, and therefore that applications concerning such cases should not be accepted for publication in the *Bulletin.* If such a rule had been followed in the recent years, the Commission's burden (in time, work and expenses) would

Source : MNHN, Paris

have been considerably reduced, and the credibility among zoologists of the Commission's decisions (in particular as regards suppression of names or changes in priority between different names) would have remained higher. I contend that below figures of a magnitude similar to those suggested above, the claim that a name has had a "current usage" is simply ridiculous.

11. In conclusion, I suggest to replace the conditions given in Art. 79 for a name being eligible for conservation by the following conditions, which should *all* be met with together:

1, the "forgotten" senior synonym recently rediscovered should not have been used by *a single author* during *a 50-year period* before the date of publication of its "rediscovery";

2, during the same period, the junior synonym should have been used by *at least 25 independent authors* and in *at least 100 publications*. I also suggest that colleagues pay attention to the other suggestions presented above in paragraph 9, and also to those provided by HOLYNSKI (1994: 13).

REFERENCES

HOLYNSKI R. B., 1994. — Structure and function or: what kind of nomenclatural regulations do we need? *Crystal*, Göd, Hungary, ser. Zool. **2**: 1-50.

NG P. K. L., 1991. — How conservative should nomenclature be? Comments on the principle of priority. *Bull. zool. Nom.* **48**: 87-91.

INDEX TO SCIENTIFIC NAMES OF AMPHIBIANS

"*aquaticae*", "*Rana viridis*" 311
arborea, *Rana* 310-312
arvalis, *Rana* 311
chrysoscelis, *Hyla* 305
clamitans, *Rana* 307
esculenta, *Rana* 311-312
Hemidactyliini 300
Hyla chrysoscelis 305
Hyla hypocondrialis 308
Hyla lactea 308
Hyla rubra 307
Hyla versicolor 305
hyla, *Rana* 312
hypocondrialis, *Hyla* 308
lactea, *Hyla* 308
megapoda, *Rana* 301
Mycetoglossini 300
pipiens, *Rana* 300-307-308
Rana arborea, 310-312
Rana arvalis 311
Rana clamitans 307
Rana esculenta 311-312
Rana hyla 312
Rana megapoda 301
Rana pipiens 300-307-308
Rana temporaria 312
Rana trilobata 300-301
"*Rana viridis aquaticae*" 311
rubra, *Hyla* 307
temporaria, *Rana* 312
trilobata, *Rana* 300-301
versicolor, *Hyla* 305
"*viridis aquaticae*", "*Rana*" 311

Source : MNHN, Paris

Bulletin du Muséum national d'Histoire naturelle, Paris, 4e série, **18**, 1996
Section A, n°s 3-4 : 321-340

Early scientific names of Amphibia Anura
II. An exemplary case: *Rana arborea* Linnaeus, 1758

by Alain DUBOIS & Annemarie OHLER

Abstract. — This paper provides a detailed analysis of the nomenclatural status of the scientific name *Rana arborea* Linnaeus, 1758, with identification of its primary, secondary and tertiary syntypes, discussion of the status of these specimens, and final designation of one of them (now lost) as lectotype of this nominal species. During this analysis, the status of the following other names are also discussed: *Rana hyla* Linnaeus, 1758; *Hyla* Laurenti, 1768; *Hyla ranaeformis* Laurenti, 1768; *Hyla rubra* Laurenti, 1768; *Hyla sceleton* Laurenti, 1768; *Hyla viridis* Laurenti, 1768; *Rana pentadactyla* Laurenti, 1768; *Hyla gibbosa* Lacépède, 1788; *Hyla aurantiaca* Daudin, 1802; *Rana bilineata* Shaw, 1802; *Hyla arborea* var. *meridionalis* Böttger, 1874; *Sphaenorhynchus eurhostus* Rivero, 1961. The lines of reasoning illustrated in detail in this case will be used again in further papers of this series dealing with many other early scientific names of Amphibia Anura.

Key-words. — Nomenclature, *Rana arborea* Linnaeus, 1758, *Hyla* Laurenti, 1768, lectotype designation, stabilization of name.

Noms scientifiques anciens d'amphibiens anoures
II. Un cas exemplaire : *Rana arborea* Linnaeus, 1758.

Résumé. — Cet article donne une analyse détaillée du statut nomenclatural du nom scientifique *Rana arborea* Linnaeus, 1758, avec l'identification de ses syntypes primaires, secondaires et tertiaires, la discussion du statut de ces spécimens, et finalement la désignation de l'un d'entre eux (actuellement perdu) comme lectotype de l'espèce nominale. À l'occasion de cette analyse, le statut des noms suivants est également discuté : *Rana hyla* Linnaeus, 1758 ; *Hyla* Laurenti, 1768 ; *Hyla ranaeformis* Laurenti, 1768 ; *Hyla rubra* Laurenti, 1768 ; *Hyla sceleton* Laurenti, 1768 ; *Hyla viridis* Laurenti, 1768 ; *Rana pentadactyla* Laurenti, 1768 ; *Hyla gibbosa* Lacépède, 1788 ; *Hyla aurantiaca* Daudin, 1802 ; *Rana bilineata* Shaw, 1802 ; *Hyla arborea* var. *meridionalis* Böttger, 1874 ; *Sphaenorhynchus eurhostus* Rivero, 1961. Les méthodes de travail et de raisonnement exposées de manière détaillée dans ce cas seront utilisées de nouveau dans les articles ultérieurs de cette série, qui traitera de nombreux autres noms scientifiques anciens d'amphibiens anoures.

Mots-clés. — Nomenclature, *Rana arborea* Linnaeus, 1758, *Hyla* Laurenti, 1768, désignation d'un lectotype, stabilisation du nom.

A. DUBOIS & A. OHLER, *Muséum national d'Histoire naturelle, Laboratoire des Reptiles et Amphibiens, 25 rue Cuvier, F-75231 Paris cedex 05*

INTRODUCTION

In the present series of papers, we intend to clarify and stabilize the status of a number of ancient scientific names of Amphibia Anura, many of which have already been discussed by and have posed problems to taxonomists. In the first of these papers (DUBOIS & OHLER 1996), we exposed some general principles that will help us to deal with these problems, but such

Source : MNHN, Paris

questions always become clearer when they are illustrated by an example. The example we chose to treat in full detail here is that of the name *Rana arborea* Linnaeus, 1758. In further papers of this series, we will not give as much detailed information, as the mode of reasoning will be similar, and only factual details will differ.

The name *Rana arborea* Linnaeus, 1758 is a particularly exemplary case of the rather complicated situations with which one is sometimes confronted when dealing with very ancient scientific names. Despite several uses prior to this book, this name was first validly (in the sense of the *Code*) used in the 1758 edition of LINNAEUS's *Systema Naturae*. As usual, LINNAEUS did not state how many specimens he had before him when naming this species, but he gave a rather high number of "synonyms" of this name (*i.e.* citations of descriptions that, according to him, referred to the same species). This should not surprise us, because the *Systema Naturae* was not an original work with primary descriptions, but a catalogue, similar to modern books like FROST's (1985) checklist, where he quoted and sometimes summarized previous detailed descriptive papers. The characters LINNAEUS (1758) gave for the species *Rana arborea* were so few and so vague that they could well apply to several hundreds of tree-frog species from almost all continents: in fact, LINNAEUS's concept of the species *Rana arborea* was closer to our current concept of the family Hylidae (see *e.g.* DUELLMAN & TRUEB 1985) than to any current concept of species within amphibians. In LINNAEUS's mind, this species occurred both in Europe and in America. However, after a rather short period of uncertainty, it became clear that the European species did not occur in America, and that LINNAEUS's concept of *Rana arborea* was a composite concept applying to several distinct species. Since then, LINNAEUS's name has been consistently applied by thousands of authors to the common European tree-frog, under the name *Hyla arborea* (Linnaeus, 1758) (family Hylidae). The logical way to stabilize the status of this name would then have appeared to be through the designation among LINNAEUS's syntypes of a lectotype from Europe. However, nobody until now has dared to take such an action, clearly because all the name-bearing types of this nominal species from LINNAEUS's collection which are still known to be in existence (now in NHRM) appeared to belong to (several) American species of Hylidae (LÖNNBERG 1896; ANDERSSON 1900; DUELLMAN 1977). Faced with this situation, all authors have left this problem unsettled, and the species *Hyla arborea* still appears in checklists (*e.g.* DUELLMAN 1977; FROST 1985) as a species without name-bearing type and without type-locality.

Recently, after electrophoretic studies, NASCETTI, LANZA & BULLINI (1995) found that the populations of *Hyla* from peninsular Italy show different allozymic patterns from those of central Europe. These authors think that the Italian populations represent a species distinct from that usually called *Hyla arborea*. They suggested to us (LANZA personal communication) that this new situation made it necessary to fix the status of the latter name. Since all syntypes of *Rana arborea* still in existence are from America, they suggested that it is urgent to ask the Commission to suppress all these syntypes and to designate a neotype in agreement with the current usage of this name. We note that the same question could also have been raised when the name *Hyla arborea* var. *meridionalis* was created for the "meridional" tree-frog (BÖTTGER 1874: 66), and a fortiori when it was raised to species level on the basis of bioacoustic studies (PAILLETTE 1967; SCHNEIDER 1968), but at that time no one raised the problem. We agree that stabilization of the status of the name *Rana arborea* Linnaeus, 1758 is necessary and requires the designation of a lectotype or of a neotype and fixation of a precise type-locality, but we think that in this

Source : MNHN, Paris

case the regular provisions of the *Code* are enough to solve this nomenclatural problem, without having to refer to the Commission. As a matter of fact, and as we already stressed it (DUBOIS & OHLER 1995a, 1996), the *Code* does not at all make it compulsory to choose a lectotype among the syntypes still available, which of course in this case would oblige us to designate as lectotype a specimen belonging to an American species.

Fig. 1 gives a complete copy of the part of the text of LINNAEUS (1758) that deals with the name *Rana arborea*. As can be seen, beside the very short and little informative diagnosis given by LINNAEUS for this species, this text contains additional information: LINNAEUS mentions seven references to descriptions or figures which, according to him, refer to the species *Rana arborea*. These references are clearly "indications" in the sense of the *Code*. We consider that all the specimens mentioned in the publications listed in this synonymy (except that preceded by ß, see below) are syntypes of *Rana arborea*, as much as the specimens which were in LINNAEUS's collections, a few of which only are known to be still in existence in the Stockholm Museum.

Before designating a lectotype among these specimens, we will analyse in detail all the information given in the seven references listed by LINNAEUS (1758: 213), numbered R1 to R7 in the order of their appearance in LINNAEUS's text. This will allow us to build a list of (at least) sixteen identified specimens, numbered S1 to S16 in chronological order of their descriptions, which, even if most of them are not yet in existence today, can be considered syntypes of *Rana arborea*, and among which we can choose a lectotype.

ABBREVIATIONS

MNHN	Muséum national d'Histoire naturelle, Paris, France
NHRM	Naturhistoriska Rijkmuseet, Stockholm, Sweden
RMNH	Rijksmuseum van Natuurlijke Historie, Leiden, Netherlands

COMMENTED LIST OF REFERENCES CITED IN THE SYNONYMY OF THE ORIGINAL DESCRIPTION OF *Rana arborea* Linnaeus, 1758

R1. "*Amoen. acad.* 1. *p.* 135. Rana pedibus fissis; unguibus subrotundis, corpore laevi: postice angustato."

This citation refers to the description of the species numbered 20 in HAST's thesis (1745: 29), as reprinted in the volume 1 of the *Amoenitates Academicae* (LINNAEUS 1749: 135). This description was based on a specimen from the "Donatio Caroli Gyllenborg", about which we give more information below under number S10. This specimen, which belongs to an American species of tree-frog, is a secondary (or possibly primary) syntype of *Rana arborea* Linnaeus, 1758.

This species described by HAST (1745: 29) under number 20 was the only one referred by him to the genus *Rana* among the specimens of the GYLLENBORG collection. In the original edition of his thesis, HAST (1745: 29) included in the synonymy of this species two frogs from SEBA's (1734, 1735) books, *i.e.* S3 and S6 below, and one from the Saint Petersburg Museum,

Source : MNHN, Paris

Hyla. 15. R. dorſo angulato tranſverſe gibbo, abdomine faſcia replicata inguinali intercepto.
Geſn. piſc. 809. Rana gibboſa 4. 5.
Habitat in Europa.
Sonus campanarum boatum e longinquo imitatur.

arborea. 16. R. corpore lævi: ſubtus punctis contiguis tuberculato, pedibus fiſſis, unguibus orbiculato-dilatatis.
Amœn. acad. 1. *p.* 135. Rana pedibus fiſſis; unguibus ſubrotundis, corpore lævi: poſtice anguſtato.
Muſ. Ad. Fr. 1. *p.* 47. Rana eadem.
Gron. muſ. 2. *p.* 84. *n.* 63. Rana.
Seb. muſ. 1. *t.* 73. *f.* 3. Rana braſilienſis gracilis.
Seb. muſ. 2. *t.* 78. *f.* 5. Rana americana rubra.
Geſn. piſc. 808. Ranunculus viridis.
β *Amœn. acad.* 1. *p.* 285. Rana pedibus fiſſis, palmis tetradactylis, plantis pentadactylis: geniculis ſubtus tuberoſis.
Habitat ſub foliis arborum Europæ, Americæ, *Muſcas in fauces revocans.*

boans. 17. R. corpore lævi: ſubtus punctis contiguis, pedibus palmatis: plantis pentadactylis, palmis tetradactylis, unguibus orbiculato-dilatatis.
Amœn. acad. 1. *p.* 285. Rana palmis tetradactylis, plantis pentadactylis palmatis, digitorum apicibus ſubrotundis.
Muſ. Ad. Fr. 1. *p.* 47. Rana eadem.
Seb. muſ. 1. *t.* 71. *f.* 3. 4. Rana ſurinamenſis.
Habitat in America.
Simillima R. arboreæ. ſed pedes omnes palmati & corpus album magnum. maculis etiam lacteis, modo hæc ſufficiant pro ſpecie diſtinguenda.

Ranæ aquaticæ oviparæ ſubeunt metamorphoſin.

FIG. 1. — Reproduction of page 213 of the 1758 edition of LINNAEUS's *Systema Naturae*, including the original descriptions of *Rana hyla* and *Rana arborea*. (Bibliothèque du Laboratoire des Reptiles et Amphibiens, MNHN).

Source : MNHN, Paris

i.e. S7 below. In the reprinted edition of his thesis, HAST (1749: 135) added a fourth synonym from the Saint Petersburg Museum, *i.e.* S8 below. All four synonyms can be considered also syntypes of *Rana arborea* Linnaeus, 1758. As will be shown in detail below, all four specimens belong to American tree-frogs.

R2. "*Mus. Ad. Fr.* 1. *p.* 47. Rana eadem."

This citation refers to the diagnosis of the species called *Rana arborea* in LINNAEUS's (1754) book. Three American specimens (S13-15) are known to correspond to this reference (see below). Three synonyms are mentioned under this name: the description of HAST (1749: 135) just discussed above, based on the specimen S10, and the two species of SEBA's (1734, 1735) frogs quoted in its synonymy, *i.e.* the specimens S3 and S6 below.

R3. "*Gron. mus.* 2. *p.* 84. *n.* 63. Rana."

This citation refers to the description of the species numbered 63 in GRONOVIUS's (1756) book. This specimen is discussed below under S16. This frog species is said to inhabit Suriname. Five names are included in the synonymy of this species: HAST's (1745, 1749) species discussed above, *i.e.* specimen S10, and the two SEBA's (1734, 1735) species included in its synonymy, *i.e.* S3 and S6; CATESBY's (1743) description of "*Rana viridis arborea*", a species from Northern America (S9); and a third species of SEBA (1735) from Lemnos (S5).

R4. "*Seb. mus.* 1. *t.* 73. *f.* 3. Rana brasiliensis gracilis."

This citation is a direct reference to SEBA's (1734) species "*Rana brasiliensis gracilis*", about which more information is given below under S3.

R5. "*Seb. mus.* 2. *t.* 78. *f.* 5. Rana americana rubra."

This citation is a direct reference to SEBA's (1735) species "*Ranula americana rubra*", about which more information is given below under S6.

R6. "*Gesn. pisc.* 808. Ranunculus viridis."

Conrad GESSNER (or Conradus GESNERUS; see ADLER 1989: 8) wrote several books, which furthermore had several editions, but LINNAEUS's reference to the name "*Ranunculus viridis*" in a page 808 suggests that the edition he had in his hands when he wrote his 1758 book was the second or the third edition of the liber IV of the *Historia Animalium*, subtitled *De Piscium et Aquatilium Animantium Natura* (GESNERUS 1604, 1620; contrary to the statement by ADLER 1989: 7, the 1620 edition of this book is the third, not the second). Three "species" of frogs are dealt with in page 808 of this book, but LINNAEUS's reference is clearly to the first one, "*Calamite*", for which GESNERUS mentions two other names ("synonyms"): "*Muta*" of PLINIUS, and "*Ranunculus viridis*" of his own book *De Quadrupedibus Oviparis* (GESNERUS 1554, reprinted 1586 and 1617). This paragraph in page 808 of GESNERUS's (1604, 1620) book contains two different pieces of information, which we regard as evidence of reference to two distinct specimens (at least): 1, a Latin text about this frog: this text is exactly copied from RONDELETIUS's (1555: 224) text entitled "De *Calamite*", which must be assumed to have been based on at least one specimen (S1); 2, a figure which is an exact reproduction of the figure of "*Ranunculus viridis*" that appears in GESNERUS (1554: 55, 1586: 60, 1617: 60), and which we regard as based on a distinct specimen (S2). Both specimens S1 and S2 are secondary syntypes of *Rana arborea* Linnaeus, 1758.

Source : MNHN, Paris

R7. "ß *Amoen. acad.* 1. *p.* 285. Rana pedibus fissis, palmis tetradactylis, plantis pentadactylis: geniculis subtus tuberosis."

This citation refers to the description of the species numbered 9 in BALK's (1746: 8) thesis, as reprinted in the volume 1 of the *Amoenitates Academicae* (LINNAEUS 1749: 285-286). This description was based on two specimens from the "Donatio Adolphi Friderici", about which we give more information below under numbers S11-12. However, it is important to stress that these two specimens *cannot* be considered syntypes of the nominal species *Rana arborea*, according to Article 72(b)(i) of the *Code* (see DUBOIS & OHLER 1996): the presence of the Greek letter ß before the reference clearly shows that LINNAEUS considered that these specimens represented a "distinct variant", which excludes these specimens from the type-series.

Finally, in the text concerning this species, BALK (1746, 1749) also refers to another SEBA's (1734) specimen, discussed in more detail below under S4: of course, this specimen also is excluded by the letter ß from the syntypes of *Rana arborea*.

COMMENTED LIST OF IDENTIFIED SYNTYPES OF *Rana arborea* Linnaeus, 1758

S1. Specimen(s) referred to in p. 224 of RONDELETIUS (1555) as "*Calamite*". Origin: region of Montpellier, Hérault, Languedoc, France. Secondary syntype(s) of *Rana arborea* Linnaeus, 1758.

RONDELETIUS's (1555) "description" does not refer precisely to particular specimens. It was composed in part of information taken from the works of PLINIUS and NICANDER, but this frog was apparently also known personally to the author, who mentioned several of its medicinal properties and who wrote: "*Ranette* nostri nominant" (RONDELETIUS 1555: 224); "Nous l'appellons en Languedoc Rainette" (RONDELET 1558: 167). Since Guilaume (sic) RONDELET (or Gulielmus RONDELETIUS) was professor at the Montpellier University (as printed on the front pages of his books), it is logical to consider that his text was in part based on specimen(s) from Montpellier's region (Southern France). However, it would be very ill-inspired to designate formally as (lost) lectotype of *Rana arborea* one of these specimens, since the only tree-frog that lives in this region is the species currently known as *Hyla meridionalis* Böttger, 1874 (see *e.g.* ARNOLD & BURTON 1978; PARENT 1981; CASTANET & GUYÉTANT 1989), a name that deserves protection since it has already been used in a high number of general publications for many years and by many distinct authors.

S2. Specimen shown in figure of p. 55 of GESNERUS (1554), and reproduced in GESNERUS (1558: 950; 1586: 60; 1604: 808; 1617: 60; 1620: 808), as "*Ranunculus viridis*". Origin: region of Zürich, Switzerland. Secondary syntype of *Rana arborea* Linnaeus, 1758.

This figure (reproduced here in Fig. 2A) shows a specimen of frog on a tree leaf (indicating an arboreal mode of life). The drawing was apparently made from a living specimen (in contrast, some other drawings in the same book are easily recognizable as made from dead collection specimens). It is of a rather poor quality, however it shows a character, the presence of a spot

Source : MNHN, Paris

FIG. 2. — A, reproduction of figure in page 55 of GESNERUS's (1554) *De Quadrupedibus Oviparis*, showing the frog species "*Ranunculus viridis*". (Bibliothèque Centrale, MNHN). B, reproduction of figure in page 63 of GESNERUS's (1554) *De Quadrupedibus Oviparis*, showing the frog species "*Rana gibbosa*". (Bibliothèque Centrale, MNHN). C, reproduction of plate IX of ROESEL VON ROSENHOF's (1758) *Historia Naturalis Ranarum Nostratium*, showing the frog species "*Rana arborea*". (Bibliothèque Centrale, MNHN).

Source : MNHN, Paris

near the groin, that can be interpreted as the end of the dark lateral stripe on the flank of the species *Hyla arborea*, which allows its distinction from the closely related species *Hyla meridionalis* (see *e.g.* ARNOLD & BURTON 1978: pl. 9; MATZ & WEBER 1983: pl. IX; DIESENER & REICHHOLF 1986: 76-79; GÜNTHER 1986: 154-157). In the front page of GESNERUS's (1558) volume, it is expressly stated that the drawings in this work are new, *i.e.* that they were made especially for these books. According to PETIT (1965: 203), most of the drawings in these books were done by GESSNER himself, others by other Zürich's artists. As, at the time of writing this book, GESSNER was living in Zürich (see *e.g.* SALZMANN 1965; ADLER 1989), we can assume that this drawing was made from a specimen of tree-frog collected in the region of Zürich. Since the drawing was apparently made from a live specimen, since it shows a character that fits with *Hyla arborea*, and since the latter is the only species of tree-frog known to occur in Zürich's region (see *e.g.* GROSSENBACHER 1988), the specimen which was used to prepare this figure, although now lost, is a good candidate for the designation as lectotype of *Rana arborea* Linnaeus, 1758.

S3. Specimen shown in fig. 3 of pl. LXXIII and described in p. 117 of SEBA (1734) as "*Rana, Brasiliensis, gracilis*". Origin: Brazil. Secondary syntype of *Rana arborea* Linnaeus, 1758.

This figure and description were used as the basis of the name *Hyla sceleton* by LAURENTI (1768: 35), and SEBA's figure was reproduced by BONNATERRE (1789: pl. 7, fig. 4). To the best of our knowledge, this name has never been allocated to any biological species, although it seems clear to us that the drawing and short description could well be applied to one (or several) Brazilian species of hylids. The specimen shown in fig. 3 of pl. LXXIII of SEBA (1734), being the only specimen on which *Hyla sceleton* Laurenti, 1768 was based, is the holotype of this species. This specimen was still in the collections of the Paris Museum at the beginning of the 19th century (DAUDIN 1802: 28, 1803: 58), but has disappeared from these collections since then (GUIBÉ 1950; personal observation). We suggest that designation of a neotype from Brazil, that would fit with the characters given by SEBA (1734), would allow the status of this name to be fixed.

Despite the numerous discussions already devoted to the name *Hyla aurantiaca* Daudin, 1802 (see *e.g.* RIVERO 1969; DUELLMAN & LYNCH 1981; LYNCH & DUELLMAN 1984), all authors until now have ignored the fact that this name, which is a junior homonym of *Hyla aurantiaca* Laurenti, 1768, is nothing but a strict replacement name for *Hyla sceleton* Laurenti, 1768. In both his texts referring to this species, DAUDIN (1802: 28, 1803: 58) stated in full words that he changed the name of this species because of its inadequacy, and that he *only with doubt* referred to this species a second specimen in the collections of the Paris Museum. Therefore, both nominal species *Hyla sceleton* Laurenti, 1768 and *Hyla aurantiaca* Daudin, 1802 have the same holotype, the specimen shown in SEBA's figure mentioned above. The second specimen mentioned by DAUDIN (1802, 1803) is still in the Paris Museum collections, under the number MNHN 4871, but contrary to the statement of GUIBÉ (1950: 18), followed by RIVERO (1969: 701), DUELLMAN & LYNCH (1981: 238) and LYNCH & DUELLMAN (1984: 122), it is not the holotype of *Hyla aurantiaca* Daudin, 1802. Therefore, RIVERO's (1969) proposal of the "new name" (*nomen novum*) *Sphaenorhynchus eurhostus* for *Hyla aurantiaca* Daudin, 1802 (preoc-

Source : MNHN, Paris

cupied) is incorrect, because, strictly speaking, being a new name for *Hyla aurantiaca* Daudin, 1802, and hence an objective synonym of it, this name is also a new name for and an objective synonym of the name *Hyla sceleton* Laurenti, 1768. FROST (1985: 175) decided to follow the suggestion of DUELLMAN & LYNCH (1981) and LYNCH & DUELLMAN (1984) to apply the name *Sphaenorhynchus lacteus* (Daudin, 1800b) (not "1802" or "1803", as written by mistake in the above quoted works) to the species which RIVERO (1969) meant to designate under the name *Sphaenorhynchus eurhostus*. Let us note however that, to be valid, this action will have to be confirmed by a vote of the International Commission on Zoological Nomenclature. We will come back to the problems raised by these names in a forthcoming paper of this series.

WAGLER (1833: 890) referred the specimen S3 in SEBA (1734) to the species "*Discodactylus ruber* mihi". Despite appearances, this is not a new name for this species, but only a new combination (hence the term "mihi") of the specific name *Hyla rubra* Laurenti, 1768 with the new generic name *Discodactylus*, proposed in the same paper by WAGLER (1833: 888) as a *nomen novum* for the generic name *Hyla* Laurenti, 1768 (this objective synonym of *Hyla* was overlooked by DUELLMAN 1977: 24).

In conclusion, the specimen S3, a frog from Brazil, is the holotype of the following three nominal species: *Hyla sceleton* Laurenti, 1768; *Hyla aurantiaca* Daudin, 1802 (nec *Hyla aurantiaca* Laurenti, 1768); and *Sphaenorhynchus eurhostus* Rivero, 1961. It cannot be chosen as lectotype of *Rana arborea* Linnaeus, 1758 if stability of the use of this name is to be maintained.

S4. Specimen shown in fig. 1 of pl. LXXV and described in p. 119 of SEBA (1734) as "*Rana, maxima, Virginiana, eximia, rara; foemina*". Origin: "Pennsylvania", no doubt in error (see HEYER 1979: 13); emended to "Indiis" by LAURENTI (1768: 32). Specimen expressly excluded (as variety ß) from the syntypes of *Rana arborea* by LINNAEUS (1758).

This specimen was the one on which was based the name *Rana pentadactyla* Laurenti, 1768. The second specimen, stated by Laurenti (1768: 32) to be kept in the "Museo Illustrissimi Comitis Turriani", was expressly excluded from the name-bearing types of the latter nominal species, according to Article 72(b)(i) of the *Code*, by its clear inclusion in a "var. ß". It is therefore in error that HEYER (1979: 13) considered both specimens as syntypes of this nominal species, but fortunately this author treated the specimen illustrated by SEBA (1734) as "name bearer", i.e. lectotype, of *Rana pentadactyla*, so that the nomenclatural status of the name remains unchanged. MÜLLER (1927: 277) restricted the type-locality of this species to "Surinam", but, as this action was not accompanied by a neotype designation, it is not valid. HEYER (1979: 13) ignored MÜLLER's designation and refrained from restricting the type-locality, as this action "would involve arbitrary decisions". However, it is clear that final stabilization of the status of this name will require such a restriction, which can be validly obtained only through the designation of a neotype from a known population. In order not to upset MULLER's (1927) action, we suggest it would be better to choose a neotype from Suriname. Pending such a designation, SEBA's specimen, now lost, remains the holotype of the species *Rana pentadactyla* Laurenti, 1768. As mentioned above, according to Article 72(b)(i) of the *Code*, this specimen cannot be considered syntype of *Rana arborea* Linnaeus, 1758.

Source : MNHN, Paris

S5. Specimen shown in fig. 2 of pl. XIII and described in p. 16 of SEBA (1735) as "*Rana lemnia*". Origin: Limnos, Greece. Tertiary syntype of *Rana arborea* Linnaeus, 1758.

This specimen is the holotype of the nominal species *Hyla ranaeformis* Laurenti, 1768 (original description shown here in Fig. 3) and *Hyla gibbosa* Lacépède, 1788, and SEBA's figure was reproduced under the latter name by BONNATERRE (1789: pl. 5, fig. 1). We discussed elsewhere (DUBOIS & OHLER 1995b) the status of these two objective synonyms, which we think apply to a European green frog of the subgenus *Rana (Pelophylax)*. This subgenus has a very com-

crura poſtica longiſſima : hinc ſaltus ingens ; digiti ſcandentes apicibus in arbicula viſcida plana, inſtar oris hirudinis dilatabilibus. CATESBY. 2. pag. 71. *hinc ſedet ſub folio, digitis adhærens, nec ſupra incumbens.*

XXV. Hyla ranæformis. *Seba II.* 13. 2.

DIAGN.
Capite rotundo plano ; oculis prominentibus ; pedibus faſciatis ; lateribus laturatius tinctis ; dorſo diſtinctiſſimo gibbo.

Var. β. (*Seba II.* 70. 4.) ſuperne maculis aſperſa.

Habitat prior in Lemno. β. Surinami.

XXVI. Hyla viridis. *Roeſel. Tab. IX. X. XI. & frontiſpic.*

DIAGN.
Supra virens, infra albens, utroque latere linea flava.

Var. β. (CATESBY *Carol.* 2. 71.) corpore tereti, linea utrinque flava, ſed recta ; diſtinguitur clamore tſchit, tſchit, tſchit, dum noſtra clamat ra, ra, ra.

C Ha-

Habitat prior in Europæ arboribus ; β in America.

XXVII. Hyla fuſca.

DIAGN.
Corpore fuſco, pedibus ſubtus ad talos, & ad ſingulos digitorum articulos tuberoſo-laciniatis.

Hoſpitatur in Muſeo Academico Upſalienſi, & Viennæ in Turriano theſauro.

XXVIII. Hyla lactea.

DIAGN.
Corpore niveo, maculis lacteis, femoribus, tibiisque ſublividis ; hypochondriis obſolete cinereo-faſciatis ; ore ampliſſimo.

Var. β. coloris ſupra cæruleſcentis ſubplumbei.

Habitat prior in America ; hoſpitatur in muſeo Academico Upſalienſi. β in muſeo Petropolitano.

XXIX. Hyla viridi-fuſca. *Merian Surinam. Tab.* 56.

DIAGN.
Corpore fuſco, maculis viridibus emarginatis ; pedibus viridi-faſciatis ; collo utrinque ſacco conico viridi oceliato.

Habitat Surinam.

XXX. Hyla tibiatrix. *Seba I.* 71. *Fig.* 1. & 2.

DIAGN.

---

ceris poſtea inſtitutis, ut continuo clamaretur hyla! hyla! hyla! quaſi ad eundem repetendum ; ad cujus imitationem dixit VIRGILIUS:

Ut liteus hyla hyla omne ſonaret.
Ecl. VI. 44.

Quam ob rem hæc quaſi Hylæ ſacerdos nomen ejusdem meruit.

FIG. 3. — Reproduction of pages 33 and 34 of LAURENTI's (1768) *Specimen Medicum*, including the original descriptions of *Hyla ranaeformis* and *Hyla viridis*. (Bibliothèque du Laboratoire des Reptiles et Amphibiens, MNHN)

Source : MNHN, Paris

plicated taxonomy and nomenclature (see DUBOIS & OHLER 1995a) and we refrain from discussing further the status of this name here. At any rate, it is clear that this specimen cannot be chosen as lectotype of *Rana arborea* Linnaeus, 1758.

S6. Specimen shown in fig. 5 of pl. LXVIII (not LXXVIII, as printed by error in LINNAEUS, 1758: 213) and described in p. 70 of SEBA (1735) as "*Ranula, Americana, rubra*". Origin: America. Secondary syntype of *Rana arborea* Linnaeus, 1758.

This figure and description were used as the basis of the name *Hyla rubra* by LAURENTI (1768: 35). The same name was used again, with reference to the same figure in SEBA, by many ancient authors, including LACÉPÈDE (1788: 327, 459), BONNATERRE (1789: 10), DAUBENTON (1782: 668), DAUDIN (1800a: 11; 1802: 26; 1803: 53) and DAUDIN in SONNINI & LATREILLE (1801: 176). According to DAUDIN (1800a: 11; 1802: 27; 1803: 54), the specimen shown in figs 1-2 of pl. VI of DAUDIN (1800a), in fig. 1 of the plate facing p. 176 of SONNINI & LATREILLE (1801), and in figs 1-2 of pl. IX of DAUDIN (1802) was kept in the Paris Museum collections, and originated from SEBA's collection; however, DUMÉRIL & BIBRON (1841: 595) stated that this specimen did not come from SEBA's collection, so that it cannot be the specimen shown in fig. 5 of pl. LXVIII of SEBA (1735). Despite this discrepancy, it is clear that DAUDIN did not propose a new name, but simply used LAURENTI's name *Hyla rubra*, even if he did not expressly quote the latter, as was often the case in his time (see the detailed discussion of this case in DUBOIS & OHLER 1996). Therefore we disagree with DUELLMAN & WIENS (1993) who recognized a nominal species *Hyla rubra* Daudin, 1802, distinct from *Hyla rubra* Laurenti, 1768.

The holotype of *Hyla rubra* Laurenti, 1768, from SEBA's collection, is not in the Paris Museum collections (DUMÉRIL & BIBRON 1841; GUIBÉ 1950; personal observation) and must be considered lost. Therefore, DUELLMAN & WIENS's (1993) designation of a neotype (RMNH 25883, from Paramaribo, Suriname) for this species is valid, and stabilizes the status of this name.

Given all this information, the specimen S6 would of course be a very bad choice for the designation of a lectotype for *Rana arborea* Linnaeus, 1758.

S7. Specimen from the Saint Petersburg collection described under Nr. 47 in p. 427 of ANONYMOUS (1742) as "*Rana surinamensis prone coerulescentis supine albi coloris, ad latera utrimque maculis nigris notata cum foetibus exclusis Pipae*". Origin: Suriname. Tertiary syntype(s) of *Rana arborea* Linnaeus, 1758.

We are not aware of any publication that would elucidate the status of the specimen, kept in alcohol, on which was based the above reference, but since this frog is said to be from Suriname, this specimen would not appear to be a good candidate for designation of a lectotype for *Rana arborea* Linnaeus, 1758.

Source : MNHN, Paris

S8. Specimen from the Saint Petersburg collection described under Nr. 55 in p. 428 of ANONYMOUS (1742) as "*Rana americana parva ventre albido; dorso plumbei coloris, lateribus ex albo et nigro varietatis*". Origin: America. Tertiary syntype(s) of *Rana arborea* Linnaeus, 1758.

The case of this name is similar to the preceding one. As this specimen is said to be from America, it would not be a reasonable choice for lectotype designation for *Rana arborea* Linnaeus, 1758.

S9. Specimens shown in pl. 71 and described in p. 71 of CATESBY (1743) as "*Rana viridis arborea*". Origin: "Virginia and Carolina", U.S.A. Tertiary syntypes of *Rana arborea* Linnaeus, 1758.

These specimens (one shown on the plate, additional ones suggested by the text), which belong to a North American tree-frog, were the basis of "var. ß" of LAURENTI's (1768) *Hyla viridis*. HOLBROOK (1842: 121-122) restricted the use of the latter name to CATESBY's (1743) species, and so doing he "almost" designated a lectotype, but this action was incorrect because, according to Article 72(b)(i) of the *Code*, mention of "var. ß" excludes these specimens from the syntypes. The same specimens were later the basis of the description by SHAW (1802: 136) of *Rana bilineata*, of which they are therefore the syntypes. According to DUELLMAN (1977: 46), they belong to the species currently known as *Hyla cinerea* (Schneider, 1799), which inhabits the southeastern U.S.A. Therefore these specimens would be a very bad choice for lectotype designation for *Rana arborea* Linnaeus, 1758.

S10. Specimen from the "Donatio Caroli Gyllenborg" described under Nr. 20 in p. 29 of HAST (1745) and in pp. 135-136 of HAST (1749) as "*Rana pedibus fissis, unguibus subrotundis, corpore laevi, pone angustato*". Origin: unknown. Secondary (or possibly primary) syntype of *Rana arborea* Linnaeus, 1758.

According to LÖNNBERG (1896: 11), a single specimen is kept in the LINNAEUS collection (now in NHRM) with the label "*Rana arborea*, Mus. Gyllenb.", but this specimen, which apparently belongs to the American species *Hyla leucophyllata* Beireis, 1783, was probably not part of the original GYLLENBORG collection described by HAST (1745, 1749). The identity of the original specimen(s) described by HAST (1745, 1749) remains therefore in doubt, but, since this author listed only American species in the synonymy of this species, it seems appropriate to admit that the latter was probably an American species. This specimen also would therefore be a very bad choice for the lectotype of *Rana arborea* Linnaeus, 1758.

S11-12. Specimens from the "Donatio Adolphi Friderici" described under Nr. 9 in pp. 8-9 of BALK (1746) and in pp. 285-286 of BALK (1749) as "*Rana pedibus fissis, palmis tetradactylis, plantis pentadactylis; geniculis subtus tuberosis*". Origin: unknown. Specimens expressly excluded (as variety ß) from the syntypes of *Rana arborea* by LINNAEUS (1758).

Source : MNHN, Paris

According to LÖNNBERG (1896: 13), two specimens from the "Donatio Adolphi Friderici" were kept in the LINNAEUS collection (now in NHRM). LÖNNBERG (1896: 13) writes: "The two discoloured specimens can hardly with certainty be classified, but certainly they do not belong to the *Hyla arborea* of recent authors. I think, it is some American species with better developed vomerine teeth." DUELLMAN (1977: 31) did not mention these two specimens in his discussion of the Linnaean syntypes of *Rana arborea* still in existence. As a matter of fact, as mentioned above, these two specimens cannot be candidates for the lectotype designation of *Rana arborea* Linnaeus, 1758 because, according to article 72(b)(i) of the *Code*, they are not to be considered syntypes of this nominal species.

S13-15. Specimens from the "Museum Drottningholmense" collection referred to in p. 47 of LINNAEUS (1754) as "*Rana arborea*". Origin: America. Primary syntypes of *Rana arborea* Linnaeus, 1758.

According to ANDERSSON (1900: 17), three specimens corresponding to this reference were kept in the LINNAEUS collection (now in NHRM). Two of these specimens were identified by ANDERSSON (1900: 17) as *Hyla punctata* (Schneider, 1799), a species from South America. DUELLMAN (1974: 10, 1977: 31, 89) further stated that these two specimens (NHRM 155) are part of the syntypes of *Calamita punctata* Schneider, 1799. The third specimen was tentatively referred by ANDERSSON (1900: 18) to the species *Hyla inframaculata* Boulenger, 1882 from Brazil, "or some other species, belonging to the same American group of the genus *Hyla*". According to DUELLMAN (1977: 31), this third specimen is not to be found now in the NHRM collection. At any rate, these three American specimens are not good candidates for the lectotype designation of *Rana arborea* Linnaeus, 1758.

S16. Specimen(s) from GRONOVIUS's "Museum Ichthyologicum" described under Nr. 63 in p. 84 of GRONOVIUS (1756) as "*Rana palmis tetradactylis fissis, plantis pentadactylis semipalmatis, unguibus digitorum subrotundis, corpore laevi, pone angustato*". Origin: Suriname. Secondary syntype(s) of *Rana arborea* Linnaeus, 1758.

We are not aware of any publication that would elucidate the status of the specimen(s) which GRONOVIUS (1756) had before him when he wrote the rather detailed description of this species, but he clearly stated that this frog was from Suriname, so that this/these specimen(s) would not appear to be good candidate(s) for designation of a lectotype for *Rana arborea* Linnaeus, 1758.

LECTOTYPE DESIGNATION FOR ***Rana arborea*** Linnaeus, 1758

The detailed survey above has allowed to identify at least sixteen specimens that could be considered as possible syntypes of *Rana arborea* Linnaeus, 1758. The number of sixteen is a number by default, because in some cases the exact number of specimens which had been used to prepare the original description cannot now be ascertained.

Source : MNHN, Paris

A detailed analysis of the data concerning these specimens shows that the latter can be referred to four categories, as follows.

1. Three specimens (S13-15) are primary syntypes of *Rana arborea*. All three refer to American species of Hylidae, and would therefore be very bad choices for lectotype designation for *Rana arborea*. Although two of these specimens (NHRM 155) are apparently the only original syntypes of *Rana arborea* to be still in existence, we propose to discard them as name-bearing types, in order to maintain the stability of nomenclature. Designation below of another, not primary, syntype, as lectotype makes these two specimens become paralectotypes of *Rana arborea*, *i.e.* specimens which do not play any more role for the clarification of the nomenclatural status of this name.

2. Three specimens (S7-9) are tertiary syntypes of *Rana arborea*. As we already underlined it (DUBOIS & OHLER 1996), tertiary syntypes should as much as possible be avoided for lectotype choice. In the present case, this is all the more justified that these three specimens originated from America.

3. Three specimens (S4, S11-12) were expressly excluded (as variety ß) from the syntypes of *Rana arborea* by LINNAEUS (1758) himself. Furthermore, one of these specimens (S4) clearly belonged to an American species, and the other two probably also.

4. Finally, seven specimens were identified as secondary syntypes of *Rana arborea*. Four of these specimens (S3, S6, S10, S16) can immediately be discarded for possible lectotype designation, as they originated from America. The three remaining specimens (S1, S2, S5) were of European origin. The detailed analysis presented above shows that these (at least) three specimens belonged to three distinct biological species. Specimen(s) S1 belong(s) to the species currently known as *Hyla meridionalis* Böttger, 1874. Specimen S5 belongs to a green frog of the *Rana (Pelophylax)* subgenus, not to the genus *Hyla*. The only syntype which clearly belongs to the species currently known as *Hyla arborea* Linnaeus, 1758 is the specimen S2. Although this specimen is now lost, it is clearly the best choice for lectotype designation for *Rana arborea*: this choice will allow this name to remain objectively and definitively attached to the central European tree-frog which has been called *Hyla arborea* or *Hyla arborea arborea* in thousands of publications already.

In conclusion, we hereby formally designate as lectotype of the nominal species *Rana arborea* Linnaeus, 1758 the specimen shown in the figure of page 55 of GESNERUS's (1554) book, here reproduced in Fig. 2A. In agreement with this designation, we hereby restrict the type-locality of this nominal species to: "region of Zürich (47°23'N, 8°32'E), canton of Zürich, Switzerland".

If in the future it appeared essential, in order to stabilize further the status of the name *Rana arborea* Linnaeus, 1758, to have a type-specimen to which some biological information (such as bioacoustic, biochemical or cytogenetic data) be attached, it would be possible to designate a neotype for this taxon. The only requirement that would then follow from our present action is that this specimen should have been collected in the region of Zürich. Such a work should be carried out paying attention to the conservation status of this species, which is now rare in the Zürich region (GROSSENBACHER 1988: 109-111).

Source : MNHN, Paris

STATUS OF THE NAME *Rana hyla* Linnaeus, 1758

The name *Rana hyla* Linnaeus, 1758 has been traditionally considered a synonym of *Rana arborea* Linnaeus, 1758 (see *e.g.* MERTENS & WERMUTH 1960: 49; GORHAM 1974: 94; DUELLMAN 1977: 31). Probably this synonymy was initially proposed because of the identity between LINNAEUS's (1758) specific name *hyla* and LAURENTI's (1768) generic name *Hyla*, the valid name of the genus including the European tree-frogs. However, this is incorrect.

This statement is not based on the examination of original syntypes of this nominal species, since no such syntypes are known to exist (LÖNNBERG 1896; ANDERSSON 1900; DUELLMAN 1977). The original text of LINNAEUS (1758: 213), which is here reproduced in Fig. 1, gives a short diagnosis of *Rana hyla* and refers to a single synonym for this name: "*Rana gibbosa*" in GESNERUS (1604: 809, 1620: 809). This name is in a situation similar to that of the name "*Ranunculus viridis*" discussed above under S2: here also the descriptive notes and drawing in liber IV of the *Historia Animalium* refer to the earlier description and drawing in liber II. The figure (reproduced here in Fig. 2B) is of a good quality and clearly shows an European brown frog of the group of *Rana (Rana) temporaria* Linnaeus, 1758 (see DUBOIS 1992). In the 1558, 1604 and 1620 editions of liber IV, GESNERUS did not provide a detailed description, but referred to the description of "*Rana gibbosa*" that he had published earlier in liber II (GESNERUS 1554: 58, 1586: 63, 1617: 63). The latter description also clearly fits with *Rana temporaria*. Besides, in both books, GESNERUS provided comments on the mating calls of these frogs (with a discussion about so-called "voiceless" populations), notes on their habitats, and discussions of previous authors who had already written about them. All this information is quite clear evidence that the species meant by this author under the name "*Rana gibbosa*" is our current *Rana temporaria*.

In order to definitively stabilize the status of the name *Rana hyla* Linnaeus, 1758, we hereby formally designate as lectotype of this nominal species the specimen shown in the figure of page 63 of GESNERUS's (1554) book, here reproduced in Fig. 2B. In agreement with this designation, and following the conclusions of the discussion above under S2, we hereby restrict the type-locality of this nominal species to "region of Zürich (47°23'N, 8°32'E), canton of Zürich, Switzerland".

The name *Rana hyla* Linnaeus, 1758 should therefore now be treated as a subjective synonym of *Rana temporaria* Linnaeus, 1758. The latter name is the name of the type-species of the genus *Rana* Linnaeus, 1758, and it has been used in thousands of publications by thousands of authors. It should therefore be protected. In order to avoid any possible threatening of this name, we hereby take a first reviser action and we afford priority to the name *Rana temporaria* Linnaeus, 1758 over *Rana hyla* Linnaeus, 1758.

Source : MNHN, Paris

STATUS OF THE NAME *Hyla viridis* Laurenti, 1768

The name *Hyla viridis* Laurenti, 1768 is traditionally referred to the synonymy of *Hyla arborea* (Linnaeus, 1758) (see *e.g.* MERTENS & WERMUTH 1960; GORHAM 1974; DUELLMAN 1977). This name is of particular nomenclatural importance, because, following STEJNEGER's (1907: 75) designation, it is the type-species of the nominal genus *Hyla* Laurenti, 1768 (which had been created with nine originally included species, some of which are now placed in other genera). So its assignation to a biological species must be clear and definitive, and not liable to raise problems in the future.

Fig. 3 provides a copy of the original description of the nominal species *Hyla viridis* Laurenti, 1768. It contains three parts. The first part starts with reference to plates IX, X, XI and frontispiece of ROESEL VON ROSENHOF (1758), followed by a short diagnosis; this clearly refers to the common European tree-frog, studied and figured in many details by ROESEL VON ROSENHOF (1758) under the name "*Rana arborea*". The second part concerns the "var. ß" of this species: it consists in a reference to CATESBY's (1743: 71) text, followed by descriptive notes, including notes on the calling behavior of the frog; this clearly refers to the American tree-frog discussed above under S9. Finally, the third part concerns the distribution of this frog, which is said to inhabit "first" the trees of Europe, and America for variety ß. We already pointed out above that HOLBROOK's (1842) "restriction" of the use of the name *Hyla viridis* to the American species is invalid, since mention of "var. ß" excludes CATESBY's specimens from the syntypes. Therefore the only remaining syntypes are those shown in ROESEL VON ROSENHOF's (1758) plates quoted in LAURENTI (1768: 33). All these specimens clearly belong to the species currently known as *Hyla arborea* (Linnaeus, 1758).

We hereby formally designate as lectotype of the nominal species *Hyla viridis* Laurenti, 1768 the calling male shown in middle left position in plate IX of ROESEL VON ROSENHOF (1758), here reproduced in Fig. 2C. Since ROESEL VON ROSENHOF lived and worked in Nürnberg (see *e.g.* ADLER 1989: 10), and since his text and illustrations were clearly prepared from living specimens which he must have collected close to his working place, we hereby restrict the type-locality of this nominal species to: "region of Nürnberg (49°27'N, 11°04'E), Bayern, Germany". This nominal species should currently stand as a junior subjective synonym of *Hyla arborea* (Linnaeus, 1758).

Acknowledgements

We are very grateful to Leo J. BORKIN (Saint-Petersburg) for providing a partial photocopy of a very rare volume (ANONYMOUS 1742), to Roger BOUR (Paris) for bibliographical advice, and to Monique DUCREUX (Paris) for the facilities provided for our work on the ancient books of the Central Library of the Paris Museum.

Source : MNHN, Paris

REFERENCES

ANONYMOUS, 1742. — *Musei Imperialis Petropolitani*. Vol. I, Pars prima qua continentur res naturales ex regno animali. Petropolitanae, Typis Academiae Scientiarum: i-viii + 1-332.

ADLER K., 1989. — Herpetologists of the past. *In* K. ADLER (ed.). *Contributions to the history of herpetology*, Oxford, Ohio, S.S.A.R.: 5-141.

ANDERSSON L. G., 1900. — Catalogue of Linnean type-specimens of Linnaeus's Reptilia in the Royal Museum in Stockholm. *Bihang K. Svenska Vet.-Akad. Handlingar* **26** (4): 1-29.

ARNOLD E. N. & BURTON J. A., 1978. — *A field guide to the reptiles and amphibians of Britain and Europe*. London, Collins: 1-272, pl. 1-40.

BALK L., 1746. — *Museum Adolpho-Fridericianum*. Holmiae, Laurentii Salvii: [i-viii] + 1-50, pl. I-II.

— 1749. — Museum Adolpho-Fridericianum. *In* C. LINNAEUS (ed.). *Amoenitates Academicae*, **1**, Holmiae & Lipsiae, Godofredum Kiesewetter: 277-326, pl. XIII-XIV.

BÖTTGER O., 1874. — Reptilien von Marocco und von den canarischen Inseln. *Abh. Senckenb. naturf. Ges.* **9**: 121-191, 1 pl.

BONNATERRE Abbé, 1789. — *Tableau encyclopédique et méthodique des trois règnes de la nature. Erpétologie*. Paris, Panckoucke : i-xxviii + 1-70, pl. 1-7 + 1-6 + 1-12.

CASTANET J. & GUYÉTANT R. (eds.), 1989. — *Atlas de répartition des amphibiens et reptiles de France*. Paris, Société Herpétologique de France : 1-191.

CATESBY M., 1743. — *The natural history of Carolina, Florida and the Bahama Islands*. Vol. II. London: [i-iv] + 1-100 + i-xliv + [i-vi], pl. 1-100.

DAUBENTON M., 1782. — Les animaux quadrupèdes ovipares, et les serpens. *In Encyclopédie méthodique – Histoire naturelle des animaux*, Tome premier, Paris, Panckoucke : 545-712.

DAUDIN F. M., 1800a. — *Histoire naturelle des quadrupèdes ovipares*. Livraison **1**. Paris, Fuchs, Delalain, Treuttel & Würtz : [1-11], pl. [I-VI].

— 1800b. — *Histoire naturelle des quadrupèdes ovipares*. Livraison 2. Paris, Fuchs, Delalain, Treuttel & Würtz : [13-24], pl. [VII-XII].

— 1802. — *Histoire naturelle des rainettes, des grenouilles et des crapauds*. Paris, Levrault : 1-108, pl. I-XXXVIII.

— 1803. — *Histoire naturelle, générale et particulière des Reptiles*. Tome huitième. Paris, Dufart : 1-439, 8 pl.

DIESENER G. & REICHHOLF J., 1986. — *Lurche und Kriechtiere*. München, Mosaik Verlag: 1-288.

DUBOIS A., 1992. — Notes sur la classification des Ranidae (Amphibiens Anoures). *Bull. Soc. linn. Lyon* **61** (10) : 305-352.

DUBOIS A. & OHLER A., 1995a. — Frogs of the subgenus *Pelophylax* (Amphibia, Anura, genus *Rana*): a catalogue of available and valid scientific names, with comments on name-bearing types, complete synonymies, proposed common names, and maps showing all type localities. *Zool. Polon.*, (1994) **39** (3-4): 139-204.

— 1995b. — Catalogue of names of frogs of the subgenus *Pelophylax* (Amphibia, Anura, genus *Rana*): a few additions and corrections. *Zool. Polon.*, (1994) **39** (3-4): 205-208.

— 1996. — Early scientific names of Amphibia Anura. I. Introduction. *Bull. Mus. natl Hist. nat.*, 4e ser., section A **18** (3-4): 297-320.

DUELLMAN W. E., 1974. — A reassessment of the taxonomic status of some Neotropical hylid frogs. *Occ. Pap. Mus. nat. Hist. Univ. Kansas* **27**: 1-27.

— 1977. — Liste der rezenten Amphibien und Reptilien. Hylidae, Centrolenidae, Pseudidae. *Das Tierreich* **95**: i-xix + 1-225.

DUELLMAN W. E. & LYNCH J. D., 1981. — Nomenclatural resolution of the identities of *Hyla aurantiaca* and *Hyla lactea*. *J. Herpet.* **15**: 237-239.

DUELLMAN W. E. & TRUEB L., 1985. — *Biology of amphibians*. New York, McGraw-Hill: i-xix + 1-670.

DUELLMAN W. E. & WIENS J. J., 1993. — Hylid frogs of the genus *Scinax* Wagler, 1830, in Amazonian Ecuador and Peru. *Occ. Pap. Mus. nat. Hist. Univ. Kansas* **153**: 1-57.

Source : MNHN, Paris

DUMÉRIL A.-M.-C. & BIBRON G., 1841. — *Erpétologie générale ou histoire naturelle complète des Reptiles*. Tome 8. Paris, Roret : i-vii + 1-792.

FROST D. R. (ed.), 1985. — *Amphibian species of the world*. Lawrence, Allen Press & Assoc. Syst. Coll.: [i-iv] + i-v + 1-732.

GESNERUS C., 1554. — *Historia Animalium*. Liber II. *De Quadrupedibus Oviparis*. Tiguri [Zürich], C. Froschoverus: [i-vi] + 1-110 + 1-27.

— 1558. — *Historia Animalium*. Liber IV. *De Piscium et Aquatilium Animantium Natura*. Tiguri [Zürich], Christoph Froschoverus: [i-xxxix] + 1-1297.

— 1586. — *Historia Animalium*. Liber II. *De Quadrupedibus Oviparis*. Francofurdi, Roberti Cambieri: [i-vi] + 1-119.

— 1604. — *Historia Animalium*. Liber IV. *De Piscium et Aquatilium Animantium Natura*. Editio secunda. Francofurti, Andreae Cambieri: [i-xl] + 1-1052 + 1-38.

— 1617. — *Historia Animalium*. Liber II. *De Quadrupedibus Oviparis*. Francofurti, Henrici Laurentii: [i-vi] + 1-119.

— 1620. — *Historia Animalium*. Liber IV. *De Piscium et Aquatilium Animantium Natura*. Editio secunda [sic]. Francofurti, Henrici Laurentii: [i-xl] + 1-1052 + 1-30.

GORHAM S. W., 1974. — *Checklist of world amphibians up to January 1, 1970*. Saint-John, The New Brunswick Museum: 1-173.

GRONOVIUS L. T., 1756. — *Musei Ichthyologici*. Tomus secundus. Lugduni Batavorum, Theodorum Haak: [i-viii] + 1-88, pl. V-VII.

GROSSENBACHER K., 1988. — Atlas de distribution des amphibiens de Suisse. *Documenta faunistica Helvetiae* **8** : 1-208.

GUIBÉ J., 1950. — *Catalogue des types d'amphibiens du Muséum national d'Histoire naturelle*. Paris, Imprimerie nationale : 1-71.

GÜNTHER R., 1986. — Ordnung Anura, Froschlurche. *In* W.-E. ENGELMANN, J. FRITZSCHE, R. GÜNTHER & F. J. OBST, *Lurche und Kriechtiere Europas*, Stuttgart & München, Enke & DTV: 113-184.

HAST B. R., 1745. — *Amphibia Gyllenborgiana*. Dissertatione Academica, Upsaliae: [i-viii] + 1-36.

— 1749. — Amphibia Gyllenborgiana. *In* C. LINNAEUS (ed.). *Amoenitates Academicae*, **1**, Holmiae & Lipsiae, Godofredum Kiesewetter: 107-140.

HEYER W. R., 1979. — Systematics of the *pentadactylus* species group of the frog genus *Leptodactylus* (Amphibia: Leptodactylidae). *Smithsonian Contrib. Zool.* **301**: i-iii + 1-43.

HOLBROOK J. E., 1842. — *North American herpetology; or, a description of the reptiles inhabiting the United States*. Volume IV. Philadelphia, J. Dobson: i-vi + 7-138, pl. 1-35.

LACÉPÈDE [B. G. E.] DE, 1788. — *Histoire naturelle des quadrupèdes ovipares et des serpens*. Vol. II, 16 cm. Paris, Hôtel de Thou : [i-iv] + 1-464, pl. I-XV.

LAURENTI J. N., 1768. — *Specimen Medicum, exhibens synopsin Reptilium emendatam cum experimentis circa venena et antidota Reptilium austriacorum*. Viennae, Joan. Thom. Nob. de Trattnern: i-ii + 1-215, pl. 1-V.

LINNAEUS C. (ed.), 1749. — *Amoenitates Academicae*, **1**, Holmiae & Lipsiae, Godofredum Kiesewetter: [i-iv] + 1-563, pl. I-XVII.

— 1754. — *Museum Adolphi Friderici Regis Svecorum, Gothorum, Vandalorumque*. Holmiae, Typographia Regia: [i-iii] + i-xxx + 1-96 + [i-vii], pl. I-XXXIII.

— 1758. — *Systema Naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locus*. Editio decima, reformata. Tomus I. Holmiae: i-iv + 1-824.

LÖNNBERG E., 1896. — Linnean type-specimens of birds, reptiles, batrachians and fishes in the Zoological Museum of the R. University in Upsala. *Bihang K. Svenska Vet.-Akad. Handlingar* **22** (4): 1-45.

LYNCH J. D. & DUELLMAN W. E., 1984. — *Hyla lactea* Daudin, 1803 (Amphibia): request for conservation under the plenary powers. *Bull. zool. Nom* **41**: 122-124.

MATZ G. & WEBER D., 1983. — *Guide des amphibiens et reptiles d'Europe*. Neuchâtel & Paris, Delachaux & Niestlé : 1-292, pl. I-XLIV.

MERTENS R. & WERMUTH H., 1960. — *Die Amphibien und Reptilien Europas (Dritte Liste, nach dem Stand vom 1. Januar 1960)*. Frankfurt am Main, Waldemar Kramer: i-xi + 1-264.

Source : MNHN, Paris

MULLER L., 1927. — Amphibien und Reptilien der Ausbeute Prof. Bresslau's in Brasilien 1913-1914. *Abh. Senkenb. naturf. Ges.* **40** (3): 259-304.

NASCETTI G., LANZA B. & BULLINI L., 1995. — Genetic data support the specific status of the Italian treefrog (Amphibia: Anura: Hylidae). *Amphibia-Reptilia* **16**: 215-227.

PAILLETTE M., 1967. — Valeur taxinomique des émissions sonores chez les *Hyla* (Amphibiens, Anoures) de la faune française. *C. r. Acad. Sci.* (D) **264** : 1626-1628.

PARENT G. H., 1981. — Matériaux pour une herpétofaune de l'Europe occidentale. Contribution à la révision chorologique de l'herpétofaune de la France et du Benelux. *Bull. Soc. linn. Lyon* **50** (3) : 86-111.

PETIT G., 1965. — Conrad Gesner, zoologiste. *Gesnerus* **22**: 195-204.

RIVERO J. A., 1969. — A new name for *Sphaenorhynchus aurantiacus* (Daudin) (Amphibia, Salientia). *Copeia* **1969**: 700-703.

ROESEL VON ROSENHOF A. I., 1758. — *Historia Naturalis Ranarum Nostratium*. Nürnberg, Johann Joseph Fleischmann: [i-viii] + i-viii + 1-116, pl. I-XXIV + frontispiece.

RONDELET G., 1558. — *Histoire entière des poissons*. Seconde partie. Lion, Mace Monhome : [i-iv] + 1-181 + [i-ix].

RONDELETIUS G., 1555. — *Universae Aquatilium Historia*. Pars altera. Lugduni, Matthiam Bonhomme: [i-xii] + 1-242 + [i-ix].

SALZMANN C., 1965. — Conrad Geßners Persönlichkeit. *Gesnerus* **22**: 115-133.

SCHNEIDER H., 1968. — Bio-akustiche Untersuchungen am Mittelmeerlaubfrosch. *Z. vergl. Physiol.* **61**: 369-385.

SEBA A., 1734. — *Locupletissimi rerum naturalium Thesauri accurata descriptio, et iconibus artificiosissimis expressio, per universam physices historiam*. Tomus I. Amstelaedami, Janssonio-Waesbergios, Wetstenium & Smith: [i-xxxiv] + 1-178, pl. I-CXI + 2 unnumbered pl.

— 1735. — *Locupletissimi rerum naturalium Thesauri accurata descriptio, et iconibus artificiosissimis expressio, per universam physices historiam*. Tomus II. Amstelaedami, Janssonio-Waesbergios, Wetstenium & Smith: [i-xxxiv] + 1-154, pl. I-CXIV.

SHAW G., 1802. — *General zoology, or systematic natural history*. Vol. III, part I. *Amphibia*. London, Kearsley: i-viii + 1-312, pl. 1-86.

SONNINI C. S. & LATREILLE P. A., 1801. — *Histoire naturelle des reptiles*. Tome II. Paris, Deterville : [i-iii] + 1-332, 19 pl.

STEJNEGER L., 1907. — Herpetology of Japan and adjacent territory. *Bull. U. S. nat. Mus.* **58**: i-xx + 1-577, pl. I-XXXV.

WAGLER J., 1833. — Deutung der in Seba's *Thesauro rerum naturalium* T. 1 et 2 enthaltenen Abbildungen von Lurchen, mit critischen Bemerkungen. *Isis von Oken* **1833**: 885-905.

Source : MNHN, Paris

INDEX TO SCIENTIFIC NAMES OF AMPHIBIANS

"americana parva", *"Rana"* 331
"americana rubra", *"Rana"* 324-325, 331
"americana rubra", *"Ranula"* 325, 331
arborea arborea, *Hyla* 334
arborea var. *meridionalis*, *Hyla* 321-322
arborea, *Hyla* 322, 328, 332, 334-336
arborea, *Hyla arborea* 334
"arborea", *"Rana"* 327, 333, 336
arborea, *Rana* 321-326, 328-329, 331-334
"arborea", *"Rana viridis"* 325, 332
aurantiaca, *Hyla* 321, 328-329
bilineata, *Rana* 321, 332
"brasiliensis gracilis", *"Rana"* 324-325, 328
Calamita punctata 333
"Calamite" 325-326
cinerea, *Hyla* 332
Discadactylus 329
Discadactylus ruber 329
eurhostus, *Sphaenorhynchus* 321, 328-329
"fissis", *"Rana palmis tetradactylis"* 333
"fissis", *"Rana pedibus"* 324, 326, 332
gibbosa, *Hyla* 321, 330
"gibbosa", *"Rana"* 324, 327, 335
"gracilis", *"Rana brasiliensis"* 324-325, 328
Hyla 321-322, 329, 333-336
Hyla arborea 322, 328, 332, 334-336
Hyla arborea arborea 334
Hyla arborea var. *meridionalis* 321-322
Hyla aurantiaca 321, 328-329
Hyla cinerea 332
Hyla gibbosa 321, 330
Hyla inframaculata 333
Hyla leucophyllata 332
Hyla meridionalis 326, 328, 334
Hyla punctata 333
Hyla ranaeformis 321, 330
Hyla rubra 321, 329, 331
Hyla sceleton 321, 328-329
Hyla viridis 321, 330, 332, 336
hyla, *Rana* 321, 324, 334-335
Hylidae 322, 333
inframaculata, *Hyla* 333
lacteus, *Sphaenorhynchus* 329
"lemnia", *"Rana"* 329
leucophyllata, *Hyla* 332
"maxima virginiana", *"Rana"* 329
meridionalis, *Hyla* 326, 328, 334
meridionalis, *Hyla arborea* var. 321-322
"Muta" 325
"palmis tetradactylis fissis", *"Rana"* 333
"parva", *"Rana americana"* 331
"pedibus fissis", *"Rana"* 324, 326, 332
(Pelophylax), *Rana* 330, 334
pentadactyla, *Rana* 321, 329
punctata, *Calamita* 333
punctata, *Hyla* 333
"Rana" 325
Rana 323, 335
"Rana americana parva" 332
"Rana americana rubra" 324-325, 331
"Rana arborea" 327, 333, 336
Rana arborea 321-326, 328-336
Rana bilineata 321, 332
"Rana brasiliensis gracilis" 324-325, 328
"Rana gibbosa" 324, 327, 335
Rana hyla 321, 324, 335
"Rana lemnia" 330
"Rana maxima virginiana" 329
"Rana palmis tetradactylis fissis" 333
"Rana pedibus fissis" 324, 326, 332
Rana pentadactyla 321, 329
"Rana surinamensis" 331
Rana temporaria 335
"Rana viridis arborea" 325, 332
Rana (Pelophylax) 330, 334
Rana (Rana) temporaria 335
(Rana) temporaria, *Rana* 335
ranaeformis, *Hyla* 321, 330
"Ranula americana rubra" 325, 331
"Ranunculus viridis" 324-327, 335
ruber, *Discodactylus* 329
rubra, *Hyla* 321, 329, 331
"rubra", *Rana americana* 324-325, 331
"rubra", *"Ranula americana"* 325, 331
sceletan, *Hyla* 321, 328-329
Sphaenorhynchus eurhostus 321, 328-329
Sphaenorhynchus lacteus 329
"surinamensis", *"Rana"* 331
temporaria, *Rana* 335
temporaria, *Rana (Rana)* 335
"tetradactylis fissis", *"Rana palmus"* 333
"virginiana", *"Rana maxima"* 329
"viridis arborea", *"Rana"* 325, 332
viridis, *Hyla* 321, 330, 332, 335-336
"viridis", *"Ranunculus"* 324-327, 335

Source : MNHN, Paris

Bulletin du Muséum national d'Histoire naturelle, Paris, 4e série, 18, 1996
Section A, nos 3-4 : 341-365

Sipuncula from the Indian Ocean and New Caledonia

by Edward B. CUTLER & Norma J. CUTLER

Abstract. — Collections of over 4200 sipunculans made by six different teams of French biologists from depths of 1-5340 m are assigned to thirty-four species. The diverse Indian Ocean locations were mostly around the Comoran Islands and the sub-Antarctic southern islands, plus a few from off Sri Lanka and French Polynesia. No new taxa are described, but eight have not been previously reported from the Indian Ocean (*Golfingia margaritacea*, *Nephasoma cutleri*, *Phascolion lucifugax*, *P. hibridum*, *P. tuberculosum*, *Onchnesoma magnibathum*, *O squamatum*, *Apionsoma murinae bilobatae*). Most of these, as well as nine other range extensions, are based on deep or cold-water material.

Key-words. — Taxonomy, New Caledonia, Indian Ocean, Sipuncula.

Les Sipunculiens de l'océan Indien et de Nouvelle-Calédonie

Résumé. — Les récoltes de plus de 4 200 Sipunculiens, réalisées par six équipes de biologistes français à des profondeurs de 1 à 5 340 m, ont porté sur trente-quatre espèces. Les divers sites de l'océan Indien étaient le plus souvent situés autour des Comores et des îles du sud de la région sub-antarctique, et quelques-uns au large du Sri Lanka et de la Polynésie française. Aucun taxon nouveau n'a été décrit, mais huit étaient déjà connus de l'océan Indien.

Mots-clés. — Systématique, Nouvelle-Calédonie, océan Indien, Sipunculiens.

E. B. CUTLER, *Museum of Comparative Zoology, Harvard University, Cambridge, MA 02138 USA* & N. J. CUTLER, *Biology Department, Hamilton College, Clinton, NY 13323*

INTRODUCTION

While much has been written about the Indian Ocean sipunculan fauna, a good contemporary starting place is the comprehensive review presented at the 1970 International Symposium on the Biology of Sipuncula and Echiura (HALDAR 1975) in which 135 species were listed (not all currently considered valid). Since 1975, the report covering the widest geographic range (CUTLER & CUTLER 1979) was based on 4000 worms (fifty-four species) most collected during the International Indian Ocean Expedition of 1963-1964, plus others by B. Thomassin and associates, most coming from along the western part of the ocean. The three subsequent reports are more restricted to shallow water material. One on the Nicobar and Andaman islands (nine species) was offered by HALDAR (1976), while HALDAR's major work (1991) focused on the Indian coastal fauna (1900 specimens and 37 species). Most recently, SAIZ (1993) reported on an interesting collection, from the "MD-32 La Réunion" project, consisting of seventeen species, four new to the Indian Ocean.

Source : MNHN, Paris

Between 1972 and 1986, six groups of French biologists made collections of benthic invertebrates, including more than 4200 sipunculans, from some part of the Indian Ocean. Many of these expeditions were conducted on board the research vessel *Marion Dufresne*. Three collections were processed by the Centre National de Tri d'Océanographie Biologique (CENTOB) and made available by M. Segonzac. These were: Benthedi, from the northern Mozambique Channel (most near the Comoran Islands of Mayotte and Glorieuses) by the vessel *Suroit* in 1977; Jasus MD-50, from St Paul and Amsterdam Islands in 1986 under the direction of M. Arnaud, Marseille; and Safari I & II from south of Madagascar in 1979 and south-west of Sri Lanka in 1981. A series of three collections made by A. Guille, Paris, from the far southern islands came to us directly in part (Kerguelen Islands, 1972-1974) and partly via CENTOB. The latter were from MD-04 in 1975 from Kerguelen, MD-08 in 1976 from Marion (Prince Edward Islands), and Crozet Island. A collection from coral around Reunion was made by P. Delacroix, île de la Réunion, in 1980. The sixth contribution was made by B. Gout, Montpellier, from Mayotte Island in the Comorans in 1983 and 1986, and from New Caledonia, French Polynesia in 1985.

This new material covers a very wide variety of Indian Ocean habitats, at latitudes of 2-50°S, and longitudes of 38-87°E, from warm tropical sand and coral to cold sub-Antarctic mud, and from depths of 1-5340 m. The inclusion of the New Caledonia material from outside the Indian Ocean (166.5°E) was to avoid producing another small report on a set of nine species, when only two of these are not already in this report (*Aspidosiphon spiralis* and *A. laevis*).

None of the material represents new species but seventeen are zoogeographically interesting, eight new to the Indian Ocean (*Golfingia margaritacea*, *Nephasoma cutleri*, *Phascolion lucifugax*, *P. hibridum*, *P. tuberculosum*, *Onchnesoma magnibathum*, *O. squamatum*, *Apionsoma murinae bilobatae*), only one coming from shallow water (*P. lucifugax*). Nine species show significant range extensions (*Nephasoma constrictum*, *Phascolion convestitum*, *P. lutense*, *Onchnesoma steenstrupii*, *Phascolosoma noduliferum*, *Apionsoma murinae murinae*, *Aspidosiphon muelleri*, *A. spiralis*, *A. zinni*). All but one of these latter extensions were into deep or cold water in the Indian Ocean. The only warm shallow exception being *A. spiralis* to New Caledonia in the Pacific.

It is difficult to discuss a limited Indian Ocean fauna since the eastern boundary is so ill-defined. More commonly one considers an Indo-West Pacific fauna (CUTLER 1994). Also, this area from Southeast Asia through Indonesia, the Philippines, to Australia is so rich in species that inclusion of this boundary region would greatly inflate any species list. This brief consideration of the sipunculan fauna is primarily limited to that area west of the Ninetyeast Ridge (see Table 1). The exception to this is the fauna from New Caledonia included here for reasons mentioned above.

One common feature of these collections is the large number of small examples, *i.e.* trunks less than 7 mm long. This can represent adult size for a few of these taxa but not most. It seems clear that the methods used to collect, sort, and process the material have improved so that smaller representatives are not lost to science. This does make the task of identification more difficult and in several cases we could not, with certainty, apply specific names. Included in this report are thirty-four species from ten of the seventeen genera. Eight of the species are represented by more than 100 specimens, sixteen have from 10-100, while ten species have fewer than ten representatives in these collections.

Source : MNHN, Paris

In the following section the station data for each species will be summarized, but more precise data can be found in the Appendix. For a general treatment of this phylum including synonymies and illustrated keys to all taxa, see CUTLER 1994.

SYSTEMATIC SECTION

Family SIPUNCULIDAE Rafinesque, 1814
Genus **SIPUNCULUS** Linnaeus, 1766

Sipunculus nudus Linnaeus, 1766

The 134 worms were collected around the Comoran Islands (11.5-13°S, 45-47.5°E) at depths between 5-38 m (one station at 275 m).

Many are less than 10 mm long, and only a few reach a trunk length of 25 mm, none approaching the more common length of 50-150 mm. All are white, transparent, and with only twenty-three or twenty-four longitudinal muscle bands which is at the low end of the range for this species. Some of the very smallest appear to be recently settled larvae. Given the small size of this material it is possible that the distinctions between *S. nudus* and *S. robustus* are not yet developed (*e.g.* nephridial attachment and brain processes) so this identification is somewhat tenuous.

DISTRIBUTION

This has been collected from temperate, sub-tropical and tropical waters in all oceans. Most are from intertidal to 30 m, but a few records are from 100-900 m. Therefore, this material is not outside the known range.

Family GOLFINGIIDAE Stephen & Edmonds[1], 1972
Genus **GOLFINGIA** Lankester, 1885
Subgenus **GOLFINGIA** Lankester, 1885

Golfingia (Golfingia) margaritacea (Sars, 1851)

Sipunculus margaritaceus Sars, 1851. *Phascolosoma margaritaceum* Danielssen & Koren, 1877. *Golfingia margaritacea*; FISHER 1952; SAIZ 1995. *Golfingia margaritacea margaritacea*; CUTLER & CUTLER 1987; CUTLER 1994.

1. Dr. Stanley J. Edmonds, who contributed much to our knowledge about the biology of Sipuncula, died at age 86 in July, 1995.

Source : MNHN, Paris

Phascolosoma ohlini Theel, 1911. *Golfingia ohlini*; WESENBERG-LUND 1955. *Golfingia margaritacea ohlini*; CUTLER & CUTLER 1987; CUTLER 1994.

All 617 worms were collected from sub-Antarctic waters (46-50°S), 254 came from Marion (38°E, 95-204 m), thirty-six were collected near the Crozet Islands (49.5-50.5°E, 192-275 m), the remaining 327 came from around the Kerguelen Islands (68.5-70.5°E) at 17-230 m.

NOMENCLATURAL NOTE

When CUTLER & CUTLER (1987) reviewed the genus *Golfingia* they retained two subspecies, but acknowledged the ill-defined nature of the boundary between the two taxa. This boundary was based partially on a non-overlapping range, but largely on two morphological differences: the presence/absence of introvert hooks and the shape of the posterior end of the trunk. SAIZ (1995) examined a large collection from the Weddell Sea ranging in length from 1.3-110 mm. He confirmed the deciduous nature of the hooks as those less than 24 mm carried hooks, but larger ones are hookless, and the end of the trunks graded from pointed to round. SAIZ concluded that the retention of subspecific rank can not be upheld and we here concur with his judgement.

The trunk length of this material ranged from 2-12 mm, but most are in the 3-7 mm range, quite small for this species. While both ends are opaque the body wall in the middle of the trunk is transparent. The introverts are 65-135% of the trunk length and may or may not bear small (30-45 µm) clear hooks. The pattern of presence/absence was less consistent than that reported above by SAIZ (1995) since even in these worms smaller than 10 mm, hooks are not always present. Most worm have eight to twelve small tentacles but one 3 mm worms exhibits sixteen. The posterior ends vary from round to pointed, a very small tail occasionally present. Sexual maturity seems to come early in this population since even in worms as small as 4 mm, gametes are present, eggs in some, sperm in others.

DISTRIBUTION

Widely distributed in the Atlantic, Arctic, and Antarctic oceans (80°N to 78°S), and less commonly in the northern and southern Pacific. They have been found at depths of 1-5300 m, but most come from less than 300 m. The deeper records are mostly at lower latitudes making this an example of tropical submergence, not bipolar distribution. The species was unknown from the Mediterranean Sea, and the Indian Ocean *per se*.

While this species has been reported from Indian Ocean longitudes, the southern latitudes have been in the 66-67° range (STEPHEN 1948 as *G. mawsoni*). Therefore, while the border between the Antarctic and the Indian Oceans is not precise, the Southwest Indian Ridge can serve as that limit. These current records are the first in this part of the world, from north of the 50th parallel, *i.e.* the Southwest Ridge. Thus, this is a new record for the Indian Ocean.

Golfingia (Golfingia) muricaudata (Southern, 1913)

These eighty worms came from five areas: eighteen worms near Mayotte (11.5-13°S, 45-47.5°E) at depths of 325-3716 m, two worms from south of Sri Lanka (5.5°S, 78.5°E) at

Source : MNHN, Paris

3660 m, and nine worms near Amsterdam and St Paul Islands (38-39°S, 77-78°E) at 315-1685 m. From further south, there are eleven worms from Marion Island (47°S, 38°E) at 204 m, and forty worms off the Kerguelens (49°S, 67-69.5°E) at 230-315 m.

The trunks are 2-35 mm long (most under 15 mm) and exhibit the distinctive posterior papillae and tail (0.5-4 mm) characteristic for this species. The small deciduous hooks may be present (in smaller) or absent (in larger worms). The body walls are transparent to translucent in the under 15 mm animals, becoming opaque and coarse in larger worms.

DISTRIBUTION

Common in deep water from the North Atlantic, and it occurs off South Africa and Bouvet Island. It is known from the northern and southern Pacific. In the Indian Ocean it has been reported from the east coast of Africa at bathyal depths, but previously unknown from the rest of the Indian Ocean. Therefore, the Sri Lanka and sub-Antarctic specimens represent a significant extension of this taxon and suggest a low density, cosmopolitan, cold water distribution.

Subgenus **SPINATA** Cutler & Cutler, 1987

Golfingia (Spinata) pectinatoides Cutler & Cutler, 1979

The three worms came from off Glorieuses (11.5°S, 47.5°E), at 24 m.

These worms having rings of unidentate hooks with basal spinelets, bilobed nephridia, but lacking a posteriorly attached spindle muscle and longitudinal muscle bands, clearly belong to this taxon.

DISTRIBUTION

Previously known from southern Madagascar and French Polynesia at intertidal depths. This new material represents only a small northward extension of its westem Indian Ocean range.

Genus **NEPHASOMA** Pergament, 1940

Nephasoma constrictum (Southern, 1913)

Eight of these worms came from near Mayotte (13°N, 45°E), at 350 m. The other nine were collected around Sri Lanka (2-8°S, 79-87°E) between 1095-4350 m.

The plump spindle-shaped trunks range from 3-40 mm long with introverts about 50-75% of the trunk length. The peculiar neck-like constriction at the base of the introvert and large, dark, dome-shaped papillae characterize this species. The hooks appear to be deciduous so that smaller worms tend to have more than larger worms. Internally the nephridia open a little behind the anus and the retractor muscles originate in the middle of the trunk. Two worms had been living in polychaete tubes and several had remnants of a grey mud coating.

Source : MNHN, Paris

DISTRIBUTION

In the northeastern Atlantic Ocean and western Mediterranean (34-51°N) at 150-4000 m. A recent find by SAIZ (1993) from Réunion at 75-750 m (plus a few to 3500 m) was the first for the Indian Ocean. Therefore, these records reinforce and extend its range northward and eastward in the colder water of the Indian Ocean.

Nephasoma cutleri (Murina, 1975)

Most of these thirty-nine worms were collected off Marion Island (47°S, 38°E) at 95-204 m. The remaining four worms lived further northeast near Sri Lanka (5.5°S, 78.5°E) at 3660 m.

They are thread-like animals, the largest being 6 mm long, with introverts 50-75% of the trunk length. This introvert length helps distinguish it from the similar *N. constricticervix* that has a much shorter introvert. The pair of very short nephridia and medium-large hooks (50-150 µm) are typical for this species.

DISTRIBUTION

Scattered Pacific Ocean reports from 80°S to 11°N, at depths between 2600-4600 m. Therefore, this report is the first for the Indian Ocean and a significant extension of its longitudinal and bathymetric range.

Nephasoma diaphanes diaphanes (Gerould, 1913)

Of these 561 worms, 382 came from around the Comoran Islands (11.5-13°N, 45-47.5°E) at 250-1390 m. Eight worms came from off Sri Lanka (1.5-6°S, 78.5-87°E) at depths of 3660-5175 m (the only species from over 4500 m in these collections), and thirty-five were collected near St Paul and Amsterdam Islands (37.5-39°S, 77.5°E) between 262-2200 m. From the sub-Antarctic islands there are seventy-six worms from Marion Island (47°S, 38°E) at 31-192 m, forty-nine worms from the Crozet Islands (46-47°S, 49.5-51.5°E) at 143-1230 m, and eleven from the Kerguelen Islands (49-50°S, 68.5-70.5°E) at 43-195 m.

The present material may contain some animals that might be called *N. abyssorum* (with smooth white skin) or *N. diaphanes corrugatum* (with rough brown skin), if they are in better condition. A few of the worms from the far southern waters had been living in arenaceous foraminiferan tests and exhibited larger dome-shaped dark papillae. These have slender, straight trunks 2-12 mm long (most less than 5 mm) that are often transparent. The introvert bears scattered, small, bluntly pointed hooks and a few tentacular lobes.

DISTRIBUTION

Cosmopolitan in cold water, most from bathyal and abyssal depths (down to 5300 m). These new data reinforce its presence in the Indian and sub-Antarctic oceans.

Source : MNHN, Paris

Family PHASCOLIONIDAE Cutler & Gibbs, 1985
Genus **PHASCOLION** Théel, 1875
Subgenus **ISOMYA** Cutler & Cutler, 1985

Phascolion (Isomya) convestitum Sluiter, 1902

Seven of these eight worms were collected off New Caledonia (22.5°S, 166.5°E) at 10-28 m, while a single worm came from Mayotte Island (12.5°S, 45°E) at 27 m. All had been living in a shelter such as an empty gastropod shell.

Since some of these are badly damaged and the trunks are only 1.5-4 mm long, we have some reservations about this identification. Nevertheless, we place these here given the equal size of the retractor muscles, the broad-based, recurved, 40-60 µm, Type II *Phascolion* hooks (fig. 30E in CUTLER 1994), and the weakly developed holdfast papillae. The papillae around the anterior end of the trunk are large and crowded, thus, except for the smaller hook size, they strongly resembles *P. tuberculosum*.

DISTRIBUTION

Mediterranean, Red Sea, Gulf of Aden and Indonesia, from 25-275 m. New reports by SAIZ from the Weddell Sea (74.5°S, 30°W) at 600-700 m indicate the presence of this species in the southern seas. Therefore, this material extends the known range further south in the Indian, and further east into the Pacific Ocean.

Phascolion (Isomya) lucifugax Selenka & de Man, 1883

All four worms came from Mayotte Island (12.5°S, 45-46.5°E) at 5-25 m, and had been living in empty gastropod shells.

This uncommon species has blunt Type III hooks (fig. 30I in CUTLER 1994) and no obvious holdfast papillae. Another diagnostic feature is the numerous tentacles, usually more than thirty. The anterior trunk papillae are dome-shaped and crowded, but otherwise the trunk appears smooth. The two equal sized retractor muscles originate very close to the posterior end. The intestine does not form coils but has irregular loops only.

DISTRIBUTION

Philippines and northern Japan at unknown depths, probably less than 100 m. This material is the first record from the Indian Ocean thus a significant range extension.

Phascolion (Isomya) tuberculosum Théel, 1875

The forty-six specimens were collected from three regions: thirty-nine came from Glorieuses (11.5-13°S, 45-47.5°E) at 23-440 m; two from St Paul and Amsterdam Islands (38-39°S, 77.5°E) at 262-315 m; five worms from New Caledonia (22.5°S, 166.5°E) at 22 m.

Source : MNHN, Paris

The two equal sized retractor muscles place these worms in this subgenus. Despite their very small size (1-2 mm) most do show the large, recurved, dark, Type II hooks (Fig. 30F in CUTLER 1994). Pale, round holdfast papillae resembling thick crepes that characterize this species are present on many, but others show only large bulbous papillae, some are almost smooth, and a few of the smallest still carry the larval array of numerous, very small papillae. When tentacles are visible there are 10-12 short ones serving to differentiate this from *P. lucifugax*. Most trunks are white to transparent and the gut is without regular coils.

DISTRIBUTION

Common in the northeastern Atlantic at depths of 25-2700 m. The few specimens from Japan and New Zealand from 93-300 m suggest a low-density population in the Pacific, a pattern reinforced by this New Caledonia record. This new material also represents the first records from the Indian Ocean, a significant extension.

Subgenus **MONTUGA**, Gibbs, 1985

Phascolion (Montuga) lutense Selenka, 1885

While one of these twenty-eight worms was found southeast of Madagascar (32°S, 48.5°E) at 3825 m, most came from the area around St Paul and Amsterdam Islands (37.5-38.5°S, 77.5°E) at 975-2200 m.

The smooth, almost transparent skin and the distinctive grey "cap" at the anterior end of the trunk is typical for this species. They create soft cocoon-like mud tubes and, this collection, are 2-9 mm long. Internally the esophagus leaves the retractor column prior to its subdivision, and the gut does form into coils.

DISTRIBUTION

Generally a cold-water species (1800-6860 m) that appears to be absent in the lower latitudes. In the southern Hemisphere it has been found in the Pacific Ocean between 36-66°S, and from 20-32°S in the Atlantic. In the Indian Ocean the only prior record is from the southern end of the Mozambique Channel (32.5°S, 13°E). In the northern Hemisphere it is known from the northwestern Pacific and the northeastern Atlantic, 47-56°N. Therefore, this material reinforces its presence in the southern Indian Ocean with a significant eastward extension.

Subgenus **PHASCOLION** Théel, 1875

Phascolion (Phascolion) hibridum Murina, 1981

These forty-five worms were collected near St Paul and Amsterdam Islands (38-39°S, 77.5°E) at 262-975 m.

Source : MNHN, Paris

These worms, that had been living in empty gastropod and scaphopod shells, are up to 10 mm long. They have distinct dark hooks, but lack holdfasts and regular gut coils. The small tentacles are well-formed and the anterior end of the trunk is surrounded by an aggregation of tall, pointed, dark papillae giving the impression of a shield. The single (fused) large dorsal retractor muscle originates near the posterior end of the trunk.

DISTRIBUTION

Malaysia and Samoa at 1500-2380 m. These worms constitute not only a significant westward extension of the known range, but also the first Indian Ocean record. The water depth is somewhat shallower but, due to the latitude, the temperature is still cold.

Phascolion (Phascolion) strombus strombus (Montagu, 1804)

326 of these 332 worms were living around the Comoran Islands (mostly from Mayotte, 11.5-13°S, 46-47.5°E) at 250-1390 m, in discarded gastropod shells. The remaining six were collected off the Kerguelen Islands (47-49.5°S, 70-71.5°E) at 31-1390 m.

While the holdfast papillae of this most common *Phascolion* are variable, most are U-shaped with pointed, thin, hardened borders. Some are rounded with the hardened protein distributed over much of its dome-like surface, reminding one of *P. tridens* but with only a single point. Since these are small worms their body walls are largely transparent. Around the anterior trunk are large, mammiform, dark reddish papillae. Type I hooks (fig. 30A in CUTLER 1994) and fewer than 20 tentacles are present. The two retractor muscles are of very different dimensions and the gut is arranged in loops.

DISTRIBUTION

Very common and eurytopic in the North Atlantic and Arctic Oceans. There are scattered records from the Caribbean, Mediterranean, and Red Sea, the Gulf of Aden, southwest Indian Ocean, Argentina, and Chile. Other records exist from the far South Pacific, and off Japan. It is known from depths of 1-4030 m, most commonly between 50-2000 m. These new worms confirm the presence of this taxon in the western and far southern Indian Ocean.

Genus **ONCHNESOMA** Koren & Danielssen, 1875

Onchnesoma magnibathum Cutler, 1969

Both worms came from very deep water, one from east of Madagascar (32°S, 48.5°E) at 3825 m, and the other from southwest of Sri Lanka (1.5°S, 87°E) at 4420 m.

The characteristic posterior radiating folds of skin or "keels", and a trunk lacking papillae that tapers into the introvert are distinctive in these specimens.

Source : MNHN, Paris

DISTRIBUTION

Widespread in the Atlantic Ocean with one record from the southeastern Pacific. Generally from depths between 3000-5500 m. This report constitutes the first from the Indian Ocean.

Onchnesoma squamatum (Koren & Danielssen, 1875)

These twelve worms came from one station off Mayotte (12.5°S, 45°E) at 325 m.

The spherical trunks are 2-5 mm long and mostly covered with closely packed large gray papillae. A few worms have smooth patches where these papillae were no longer present.

DISTRIBUTION

Known from the northern Atlantic (commonly 150-1400 m, a few down to 2300 m), and Mediterranean Sea (shallow water, 10-55 m). Thus, these worms are another first record from the Indian Ocean.

Onchnesoma steenstrupii Koren & Danielssen, 1875

The 145 worms were collected near Mayotte (12.5-13°S, 45°E) at 235-815 m.

The spherical trunks are 2-5 mm long and have a series of keels radiating out from the posterior tip composed of tiny plate-like papillae. The introvert is several times the length of the trunk and internally it appears to have a single retractor muscle originating very near the posterior end.

DISTRIBUTION

Found in much of the Atlantic Ocean, (23°S to 57°N), and in the higher latitudes of the western Pacific, and the southwestern Indian Oceans (35°S, 22.5°E). In general it inhabits waters at bathyal depths on continental slopes (100-1600 m, rarely 40-3000 m). So this new material extends the range further up into the western Indian Ocean.

Family PHASCOLOSOMATIDAE Stephen & Edmonds, 1972
Genus **PHASCOLOSOMA** Leuckart, 1828

Phascolosoma nigrescens (Keferstein, 1865)

The fifteen worms were present in three collections at depths of 1-30 m: nine came from Réunion (21.5°S, 56°E), five from the Comoran Islands (12.5-13°S, 45.5-46.5°E), and one from New Caledonia (22.5°S, 166.5°E).

These 4-30 mm worms have body walls that vary from almost transparent in the smallest, to a uniform pale brown color. One significant attribute is the many rings of hooks (more than fifty) that have a distinctive internal structure. Often the rings extend to near the base of the

Source : MNHN, Paris

introvert, which is longer than the trunk. The unremarkable trunk papillae are of uniform size and of the same color as the skin.

DISTRIBUTION

Very widespread circumtropical species; generally between 30°N and 30°S, in shallow waters of the world's oceans. Thus, this material fills in within the known range.

Phascolosoma noduliferum Stimpson, 1855

These eleven worms came from near the St Paul and Amsterdam Islands (38°S, 77.5°E) at depths of 75-90 m.

The trunks are only 3-5 mm long making them difficult to identify with confidence. They do have large papillae with the distinctive platelets, and the hooks are in many rings varying somewhat in detail. They are referred to this species with some hesitation.

DISTRIBUTION

Intertidal from southern Australia and Tasmania, plus deeper water off the Philippines, New Guinea and New Zealand. This record is, therefore, a major westward extension into the southern Indian Ocean.

Phascolosoma scolops (Selenka & de Man, 1883)

Most of these worms (24/29) were collected on Réunion (21.5°S, 56°E) from intertidal depths, while the remaining five came from the Comoran Islands (11.5-12.5°S, 46-47.5°E) at 25 m.

The trunk lengths are from 3-21 mm, most less than 10 mm and most are white with darker red dome to cone-shaped papillae that are larger and more concentrated at each end. A few of the very smallest appear to be recently settled juveniles. The long introvert has dark patches along its dorsal surface and fewer than twenty-five rings of hooks.

DISTRIBUTION

Common throughout the Indo-West Pacific, including northern Japan, south to northern Australia, and east to Hawaii. Usually found at intertidal and shallow depths (< 30 m). Recently reported from Reunion at 1-10 m (SAIZ 1993). Some reports from off western Africa exist but these may be misidentified *P. stephensoni*. This material fits into the known range.

Phascolosoma stephensoni (Stephen, 1942)

The two worms came from the intertidal zone of Réunion (21.5°S, 56°E).

Source : MNHN, Paris

Neither of these worms were complete being represented by the anterior portion only. The identification is based on the unique hooks with both a clear streak and crescent, and the cone-shaped preanal papillae that are smooth and red.

DISTRIBUTION

In the Mediterranean Sea, eastern Atlantic from the Azores south, western and northwestern Indian Ocean (Durban, Mozambique, Somalia, southwestern India), and western Pacific. These Reunion collections are a small extension of the known range into the central Indian Ocean.

Genus **ANTILLESOMA** (Stephen & Edmonds, 1972)

Antillesoma antillarum (Grube & Oersted, 1858)

Five of these six worms lived on Réunion (21.5°S, 56°E) in intertidal water, and the sixth was collected off Mayotte (12.5°S, 45.5°E) at 8 m.

These worms are small for this species being only 4-6 mm long. Nevertheless, they do exhibit the large dark papillae over most of the body, a short introvert with no hooks, bushy tentacles, and many contractile vessel villi that characterize this species.

DISTRIBUTION

This is a cosmopolitan species found in tropical and subtropical, intertidal and shallow waters, including many locations in the Indian Ocean. The most recent report is also from Réunion (SAIZ 1993), so this new material only reinforces our prior knowledge.

Genus **APIONSOMA** Sluiter, 1902

Apionsoma misakianum (Ikeda, 1904)

Most of these 192 worms were collected off New Caledonia (22.5°S, 166.5°E) at 8-28 m, fifty-four came from the Comoran Islands (11.5-13°S, 45-47.5°E) at 15-38 m, and four had been living on Réunion (21.5°S, 56°E) between 1-15 m.

The slender, 2-10 mm, spindle-shaped worms have very long thin introverts bearing rings of hooks near the tip. The round posterior papillae help distinguish this from the hookless but similar *A. trichocephala*, both having four slender retractor muscles and bilobed nephridia. The small hooks have the comb-like array of basal spinelets.

DISTRIBUTION

Widespread but not common in shallow tropical and subtropical waters of the Indian (East Africa, Madagascar, western India, western Australia), Pacific, and western Atlantic oceans. Most recently SAIZ (1993) has reported this from Réunion at 58-77 m, so these new specimens merely confirm its presences in the Indo-West Pacific.

Source : MNHN, Paris

Apionsoma murinae murinae (Cutler, 1969)

The waters around the Comoran Islands yielded twenty-six of these forty-three worms (11.5-13°S, 45-47.5°E) at 250-1125 m. Another sixteen came from near St Paul and Amsterdam Islands (38-38.5°S, 77.5°E) at 1430-2200 m, and the deepest specimen was collected south of Sri Lanka (5.5°S, 78.5°E) at 3600 m.

The large mammiform papillae on the posterior quarter of these plump, spindle-shaped, 2-10 mm worms with single lobed nephridia, are characteristic. Internally the four very thin retractor muscles originate close to the ventral nerve cord.

DISTRIBUTION

Widespread in the northern Atlantic, down to 15°S on the eastern side at 1000-5200 m. In the Pacific it has been reported in the Bering Sea and in deep waters of the southern Pacific. It is also known from both sides of the Indian Ocean (Kenya, Philippines, Indonesia, at 300-600 m).

These Indian Ocean records are from CUTLER (1977), but have been mistakenly credited to *A. murinae bilobatae* in subsequent works including CUTLER 1994. So while this new material nicely fills in large gaps within the Indian Ocean, it is not new for the ocean. This does complete the circle showing this to be well established around the globe.

Apionsoma murinae bilubatae (Cutler, 1969)

Two samples yielded sixty-eight worms from Mayotte (13°S, 45.5°E) at 350-625 m.

The presence of a short second lobe on the nephridia (10-40 % of the primary lobe), and a flask-shaped trunk with pale thin walls and rounded posterior end differentiate this taxon from the nominate form.

DISTRIBUTION

A northern Atlantic subspecies that is more restricted than the nominate form (300-1900 m). In the Mediterranean it has been found at 160-1230 m. Earlier attributions of this taxon from the Indian Ocean were errors, see *A. murinae murinae*. Therefore, this is the first record from the Indian Ocean and a significant extension of its known range.

Apionsoma trichocephalus Sluiter, 1902

Most of the 286 worms came from the Comoran Islands (12.5-13°S, 45-46.5°E) at 2-32 m. The remaining forty-three were collected off New Caledonia (22.5°S, 166.5°E) at 8-22 m.

This small (2-10 mm) slender, spindle-shaped, sand-dwelling worm is the only member of this genus lacking hooks on the thin introvert that is 6-8 times the length of the trunk. Tentacles also appear to be lacking. The trunk is smoother than the similar hook-bearing *A. misakianum*

Source : MNHN, Paris

with inconspicuous papillae. Several of the worms from Mayotte, even those with trunks only 5 mm long, are carrying large eggs.

DISTRIBUTION

Southeastern United States and Gulf of Mexico, West and South Africa, around the western and northern margins of the Indian Ocean, Vietnam, Japan, Indonesia, Australia, New Zealand, and Costa Rica (unknown from the central Pacific). Found at intertidal depths to 100 m. These new collections reaffirms its presence in the western Indian Ocean while the New Caledonia records complement other Pacific Ocean reports.

Family ASPIDOSIPHONIDAE Baird, 1868
Genus **ASPIDOSIPHON** Diesing, 1851
Sub-genus **ASPIDOSIPHON** s. str.

Aspidosiphon (Aspidosiphon) elegans (Chamisso & Eysenhardt, 1821)

All twenty-seven specimens were collected from intertidal water on Réunion (21.5°S, 56°E).

While several of the worms are damaged or incomplete, trunk lengths are from 2.5-20 mm, but most are less than 10 mm long with almost transparent skin. The ungrooved, uniformly granular anal shields are golden in color. Hooks of two types are present. The Type A, compressed, recurved, bidentate hooks in rings, and the Type C, conical, scattered hooks on the dorsal side of the introvert that are less dark in the smaller worms (figs 55A & 62A in CUTLER 1994).

DISTRIBUTION

Widespread and common in the Indian and western Pacific oceans to Hawaii, and in the Caribbean. Lives in dead coral and soft rock in shallow waters. These new records reinforce their presence in the central Indian Ocean.

Aspidosiphon (Aspidosiphon) gracilis gracilis (Baird, 1868)

Three of these six worms were taken from Mayotte (12.5°S, 45°E) at 2-25 m, and the others came from New Caledonia (22.5°S, 166.5°E) at 16 m.

Partially due to their small size (2-8 mm trunks) these worms are referred here with some reservation. The distinguishing attributes are the weakly developed ungrooved anal shield and the presence of only unidentate hooks. One 6 mm specimen died with the introvert fully extended showing six short lobes for nuchal tentacles.

DISTRIBUTION

The northern and eastern Indian Ocean to the Philippines, generally in intertidal coral rock. Therefore, this questionable material extends the range southward on the western side and a little further into the western Pacific Ocean.

Source : MNHN, Paris

Aspidosiphon (Aspidosiphon) muelleri Diesing, 1851

This is by far the most commonly encountered species in these collections coming from four areas: the Comoran Islands yielded 1346 worms (11.5-13°S, 45-47.5°E) at 5-705 m, four worms were collected near the Kerguelens (49.5°S, 70°E) at 31 m, seven worms were found off St Paul and Amsterdam Islands (38.5°S, 77.5°E) at 135-575 m, and forty-four came from New Caledonia (22.5°S, 166.5°E) at 10-28 m. About 1300 of the 1400 specimens were collected from depths greater than 250 m. Most had been living in gastropod and some in scaphopod shells while at least a few had been living in coral rock.

Most of these worms are transparent or white and 1-4 mm long. Some are 5-10 mm long, only a few are in the 10-25 mm range. The smallest worms, around 1 mm long, still exhibit larval papillae and are clearly recently settled juveniles. Since most of these worms are less than 5 mm they have just the beginning of grooves and patches of hardened protein on their shields. The smallest have only light brown dots of denser material, with intermediate forms, from pale to the typical heavy dark shields in those over 15 mm long. The small array of cone-shaped spines along the ventral margin of the anal shield was present in some of the larger worms but not evident on most of those under 5 mm long. Those with undeveloped shields can look very similar to some *Phascolion* species. Only unidentate compressed hooks are present, and in a few specimens scattered hooks existed along the whole introvert. Eggs were present in worms as small as 4 and 6 mm.

DISTRIBUTION

Common in the northeastern Atlantic (48-10°N), through the Mediterranean and Red seas, and along the east coast of Africa to Madagascar and South Africa. Sri Lanka and Indonesia are the other Indian Ocean records. There are reports from the western margin of the Pacific from Japan through southeast Asia to Australia and the Kermadec Islands. It seems to be absent from most of the Pacific Ocean; one record near Chile. In the western Atlantic only one record from southern Brazil is known. Often found at depths of 5-400 m, occasionally as deep as 1000 m and rarely as deep as 2900 m. Most often found in discarded gastropod or scaphopod shells. Some from shallow, warm water live in the bases of solitary corals (previously known as *A. corallicola* or *A. jukesii*). Thus, while this Comoran material is not surprising, the few from the far southern islands constitute an extension into that part of this ocean and the New Caledonia worms constitute a small extension into the Pacific.

Aspidosiphon (Aspidosiphon) spiralis Sluiter, 1902

These twenty-five worms all came from New Caledonia (22.5°S, 166.5°E) at 13-22 m, and had been living in gastropod shells.

This rare species was originally based on only four worms and the 4-7 mm animals we have are much smaller than the 40 mm type specimen. Ours differ in a few ways. The main factor pointing to this species (and differentiating it from the similar *A. muelleri*) is the ungrooved anal shield that is made up of irregular squares and dark patches that spread past the anus and over the anterior end of the trunk. The anterior ventral edge shows a few small cone-shaped

Source : MNHN, Paris

spines on some worms. Rings of hooks, present in the type, could not be located in this material. We found only scattered Type B, pyramidal hooks (15-30 µm) that are dispersed over most of the introvert.

DISTRIBUTION

Indonesia, in gastropod shells, at 10-90 m. Thus, this new material, if real, extends its range a small distance into the western Pacific Ocean.

Sub-genus **PARASPIDOSIPHON** (Stephen, 1964)

Aspidosiphon (Paraspidosiphon) laevis de Quatrefages, 1865

The four specimens were collected off New Caledonia (22.5°S, 166.5°E) at 11-12 m.

Distinct longitudinal muscle bands can be seen through the body wall in these 8-20 mm worms. Unidentate Type A hooks are arranged in rings, and the dark anal shield is grooved. The anterior end of the spindle muscle does branch with the larger strand going to the body wall posterior to the anus, and the other part continuing anteriorly as in most species. The retractor muscles originate in the third quarter of the trunk, not near the posterior end as in the similar *A. coyi*.

DISTRIBUTION

Widespread, but low density, in warm waters in the Indo-West Pacific east to Hawaii. Also present in warm water on both sides of the Atlantic. Inhabits shallow-water coral rock. This new material fits into the known range.

Aspidosiphon (Paraspidosiphon) steenstrupii Diesing, 1859

Twelve of these thirteen worms were collected from Réunion (21.5°S, 56°E) at 1-20 m, while a single specimen was found off Mayotte (12.5°S, 45.5°E) at 20 m.

Many of these have trunks measuring 20-27 mm, but a few are in the 5-10 mm range. Some worms have been damaged and are without a posterior end. The longitudinal muscle bands can be seen through the body wall, better developed in the larger worms, and the ungrooved, granular anal shields are of the creamy white variety. The skin at the anterior end of the larger worms has a rough "corky" appearance.

DISTRIBUTION

Throughout the western and northern Indian Ocean and the western Pacific islands to Hawaii. Also collected from the Caribbean, Cape Verde Islands, and the Gulf of Guinea. It lives in shallow-water coral rocks. This new material does not expand its known range.

Source : MNHN, Paris

Sub-genus **AKRIKOS** Cutler & Cutler, 1989

Aspidosiphon (Akrikos) thomassini Cutler & Cutler, 1979

All but three of these seventeen worms came from Mayotte (12.5°S, 45°E) at 2-3 m (one station at the unusual depth of 340 m), the other three were taken at New Caledonia (22.5°S, 166.5°E) at 19 m.

The external morphology of this species is one of the least "aspidosiphonid" in this genus, sometimes looking more like a *Nephasoma* species. It has a very weakly developed anal shield, no caudal shield, and an introvert that is 3-4 times the trunk length coming off at much less than a right angle to the trunk. Hooks are not present, and one worm has its introvert fully extended showing previously unseen tentacular lobes. The anterior of these 2-12 mm trunks do have dispersed papillae and a rough or reticulated appearance. The two thin retractor muscles originate at, or very near, the posterior end.

DISTRIBUTION

Madagascar and French Polynesia, in intertidal coral sands. This new material is from the same or very close to previously known locations. The deeper records are of interest.

Aspidosiphon (Akrikos) zinni[1] Cutler, 1969

The four worms came from one station near St Paul and Amsterdam Islands (34.5°S, 77.5°E) at 2200 m.

While this species rarely exceeds 5 mm, the largest worm in this collection is 4 mm long. They are transparent, very thin, and have the characteristic golden-brown, fine-grained, flat anal shield with distinct borders.

DISTRIBUTION

Common in the northern Atlantic Ocean at depths of 1100-4400 m, plus two records from off the Congo River and two from the Indian Ocean (Mozambique Channel and Reunion at 45-1425 m). Often lives in arenaceous foraminiferan tests. This material does extend its range further into the southern Indian Ocean.

Genus **CLOEOSIPHON** Grube, 1868

Cloeosiphon aspergillus (de Quatrefages, 1865)

All six worms were collected on Réunion (21.5°S, 56°E) at 1-30 m.

1. Prof. Donald J. Zinn, for whom this species was named, died at age 85 in September, 1996.

Source : MNHN, Paris

TABLE 1. — Sipunculan species in this report with Indian Ocean literature records. Regions: We - western (Africa, Madagascar, Comoran). No - northern (Arabian Sea, India, Sri Lanka). Ce - central (ocean and islands far from large land masses). So - southern (south of 35°S., sub-Antarctic). () = material in this report; s = shallow, 0-50; m = mid-depths, 50-500; d = deep, > 500 m; # = New Caledonia species, < 30 m. Reference numbers relate to numbered items in References.

	REGIONS				REFERENCES
	We	No	Ce	So	
Family SIPUNCULIDAE					
Genus SIPUNCULUS					
S. nudus	s(s)	s	-	-	8, 13, 15, 19, 23, 24, 39, 51, 54
Family GOLFINGIIDAE					
Genus GOLFINGIA					
G. margaritacea	sm	-	-	sm(sm)	34, 43, 50, 58
G. muricaudata	d(d)	-(d)	-	d(md)	8, 16, 17
G. (Spinata) pectinatoides	s(s)	-	-	-	8
Genus NEPHASOMA					
N. constrictum	-(d)	-(d)	md	-	41
N. cutleri	-	-(d)	-	-(m)	new
N. diaphanes	m(d)	-(d)	md	-(md)	8, 41, 58
Family PHASCOLIONIDAE					
Genus PHASCOLION					
P. hibridum	-	-	-	-(d)	new
P. strombus	sm(d)	sm	-	-(md)	8, 9, 18, 32, 33, 52, 58
P. (Isomya) convestitum #	m(s)	m	-	-	8, 33
P. (Isomya) lucifugax	-(s)	-	-	-	new
P. (Isomya) tuberculosum #	-(m)	-	-	-(m)	new
P. (Montuga) lutense	-	-	-(d)	-(d)	new
Genus ONCHNESOMA					
O. magnibathum	-	-(d)	-(d)	-	new
O. squamatum	-(d)	-	-	-	new
O. steenstrupii	m(d)	-	-	-	52
Family PHASCOLOSOMATIDAE					
Genus PHASCOLOSOMA					
P. nigrescens #	s(s)	s	s(s)	-	1, 3, 8, 11, 14, 17, 23, 24, 25, 30, 31, 33, 35, 37, 40, 41, 45, 56, 58
P. noduliferum	-	-	-	-(m)	new
P. scolops	s(s)	s	s(s)	-	3, 5, 8, 12, 23, 24, 25, 27, 30, 41, 45, 46, 49, 52, 54, 58
P. stephensoni	s	s	-(s)	-	24, 37, 49, 58
Genus ANTILLESOMA					
A. antillarum	s(s)	s	s(s)	-	8, 13, 24, 25, 31, 41, 44, 45, 46, 58
Genus APIONSOMA					
A. misakianum #	sm(s)	s	md(s)	-	8, 24, 41, 57, 58

Source : MNHN, Paris

	REGIONS				REFERENCES
	We	No	Ce	So	
A. murinae murinae	-(d)	-	-(d)	-(d)	new
A. murinae bilobatae	d(d)	-	-	-	5
A. trichocephalus #	s(s)	s	-	-	8, 24, 33, 52
Family ASPIDOSIPHONIDAE					
Genus ASPIDOSIPHON					
A. elegans	s	s	-(s)	-	6, 22, 24, 29, 30, 56
A. gracilis #	-(s)	s	-	-	24, 26
A. muelleri #	s(sd)	sm	md	-(sd)	2, 3, 8, 33, 41, 46, 54, 56
A. spiralis #	-	s	d	-	41, 46
A. (Akrikos) thomassini #	s(s)	-	-	-	8
A. (Akrikos) zinni	m	-	md	-(d)	8, 41
A. (Paraspidosiphon) laevis #	s	s	-	-	8, 12, 23, 24
A. (Paraspidosiphon) steenstrupii	s(s)	sm	sm(s)	-	5, 8, 23, 24, 29, 37, 45, 49, 54
Genus CLOEOSIPHON					
C. aspergillus	s	s	s(s)	-	3, 8, 12, 13, 24, 30, 40, 41, 45, 46, 54

This is probably the easiest sipunculan to identify with its distinctive white cone-shaped anal shield made up of closely set diamond-shaped units with the introvert protruding through its center along the main trunk axis.

DISTRIBUTION

Widespread in the Indo-West Pacific stopping west of Hawaii. Lives in coral rock. The most recent record is also from Réunion (SAIZ 1993) so this material does not add to the known range.

REFERENCES

Numbers relate to numbers in Table 1.

1. AUGENER H., 1903. — Beiträge zur Kenntnis der Gephyreen nach Untersuchung der im Göttinger zoologischen Museum befindlichen Sipunculiden und Echiuriden. *Arch. für Naturg.* **69**: 297-371.
2. BOUVIER E. L., 1894. — Un nouveau cas de commensalisme : Association de vers du genre *Aspidosiphon* avec des polypes madréporaires et un mollusque bivalve. *C. R. Acad. Sci.*, Paris **119** : 96-98.
3. CUTLER E. B., 1965. — Sipunculids of Madagascar. *cah ORSTOM, Océanogr.* **3** (4): 51-63.
4. — 1969. — New species of Sipuncula from the western North Atlantic. *Proc. Biol Soc. Wash.* **82**: 209-218.
5. — 1977a. — The bathyal and abyssal Sipuncula. *Galathea Rep.* **14**: 135-156.

Source : MNHN, Paris

6. — 1977b. — Shallow water sipunculans collected by the Galathea Expedition (Sipuncula). *Steenstrupia* **4**. 151-155.
7. — 1994. — *The Sipuncula, their systematics, biology, and evolution.* Cornell University Press, Ithaca, NY, 437 p.
8. CUTLER E. B. & CUTLER N. J., 1979. — Madagascar and Indian Ocean Sipuncula. *Bull. Mus. nat. Hist. nat.*, Paris, 4e série, A **1** (4): 941-990.
9. — 1980. — Sipuncula collected by the R/V Vema. *J. Zool.*, **190**: 193-209.
10. CUTLER E. B. & GIBBS P. E., 1985. — A phylogenetic analysis of higher taxa in the phylum Sipuncula. *Syst. Zool.* **34**: 162-173.
11. CUTLER E. B. & KIRSTEUER E., 1968. — Additional notes on some Sipuncula from Madagascar. Results of the Australian Indo-West Pacific Expedition, 1959-1960, part 12. *Zool. Anz.* **180**: 352-356.
12. FISCHER W., 1892. — Übersicht der von Herrn Dr. F. Stuhlmann auf Sanzibar und an der gegenüberliegenden Festlandsküste gesammelten Gephyreen. *Jahrb. Hamb. Wiss. Anst.* **9** (2): 79-89.
13. — 1895. — Die Gephyreen des Naturhistorischen Museums zu Hamburg. *Abh. Geb. Naturwiss.*, Hamburg **13**: 1-24.
14. — 1913. — Über einige Sipunculiden des Naturhistorischen Museums zu Hamburg. *Jahrb. Hamb. Wiss. Anst.* **30** (2): 93-101.
15. — 1914. — Weitere Mitteilungen über die Gephyreen des Naturhistorischen (Zoologischen) Museums zu Hamburg. *Jahrb. Hamb. Wiss. Anst.* **31**: 1-28.
16. — 1920. — Gephyreen der antarktischen und subantarktischen Meere. *Deutsche Südpolar Expedition 16, Zoologie* **8**: 409-430.
17. — 1922. — Gephyreen der deutschen Tiefsee Expedition, auf des Dampfer "Valdivia" 1898-1899. *Wiss. Ergebn. Deutsch. Tiefsee Exped.*, Valdivia **22** (1): 1-26.
18. — 1923a. — Zwei Sipunculiden des Kapgebietes nebst einer Zustammenstellung der bekannten Arten dieses Gebietes, und ihrer faunistischen Beziehung zur Ost- und Westkuste. *Göteborgs Kungl. Vetensk. Vitterhets-Samhölles Handl.* **25** (4): 1-8.
19. — 1923b. — Gephyreen des Golfes von Siam. *Vidensk. medd. Dansk nat. Inst. Foren.* **76**: 21-27.
20. GEROULD J. H., 1913. — The sipunculids of the eastern coast of North America. *Proc. U.S. Nat. Mus.* **44**: 373-437.
21. GIBBS P. E., 1985. — On the genus *Phoscolion* with particular reference to the northeast Atlantic species. *J. Mar. Biol. Ass. U. K.* **65**: 311-323.
22. GRUBE E., 1868b. — Beschreibungen einiger von Georg Ritter von Frauenfeld gesammelter Anneliden und Gephyreen des rothen Meeres. *Verh. Kaise Konigl. Zool. Bot. Ges. Wien* **18**: 629-650.
23. HALDAR B. P., 1976. — Sipuncula from the Andaman and Nicobar islands. *Rec. Zool. Surv. of India* **70**: 109.
24. — 1991. — Sipunculans of the Indian coast. *Mem. Zool. Surv. of India* **17** (4): 1-169.
25. HAMMARSTEN O., 1915. — Gephryeen von Madagaskar gesammelt van W. Kaudern 1911-1912. *Ark. Zool.* **9** (10) 26: 1-3.
26. HÉRUBEL M. A., 1904. — Liste des sipunculides et des échiurides rapportés par M. Ch. Gravier du Golfe de Tadjourah (Mer Rouge). *Bull. Mus. natl. Hist. nat.*, Paris **10**: 562-565.
27. — 1907. — Recherches sur les sipunculides. *Mém. Soc. zool. Fr.* **20**: 107-418.
28. IKEDA I., 1904. — The Gephyrea of Japan. *J. Coll. Sci., Imp. Univ. Tokyo* **20** (4): 1-87.
29. JOHNSON P., 1964. — Two new species of *Aspidosiphon* (Sipunculoidea). *Ann. Mag. nat. Hist.*, ser. 13 **7**: 331-335.
30. LANCHESTER W. F., 1905b. — Gephyrea in the marine fauna of Zanzibar and British East Africa from the collections made by C. Crossland in 1901-1902. *Proc. Zool. Soc. Lond.* **1**: 28-35.
31. LEROY P., 1936. — Les sipunculiens du Muséum National d'Histoire Naturelle de Paris. *Bull. Mus. natl. Hist. nat.*, Paris, ser. 2 **8**: 423-426.
32. MURINA V. V., 1967. — New facts about the distribution of marine sipunculid worms in the Red Sea and the Gulf of Aden. *In Some results of Expedition III to the Red Sea Inhuma.* Express information, Academy of Sciences UkSSR: 52-56.
33. — 1970. — Contributions to the fauna of sipunculid worms from the Aden Gulf. *Vest. Zool.* **2**: 65-71.

Source : MNHN, Paris

34. — 1972. — Contribution of the sipunculid fauna of the Southern Hemisphere. *Zool. Inst. akad. Nauk* SSSR **11** (19): 294-314.

35. — 1975. — New taxa of the genus *Golfingia*. *Zool. Zh.* **54**: 1085-1089.

36. — 1981a. — First report of the sea worms Sipuncula and Echiura from littoral Somali. *Vest. Zool.* **1**: 11-18.

37. — 1981. — New species of the genus *Phascolion* (Sipuncula) from the shells of Scaphopoda. *Zool. Zh.* **60**: 348-352.

38. PERGAMENT T. S., 1940. — *On a new genus Nephasoma from the Arctic Ocean. Results of cruising expedition on icebreaker G. Sedov 1937-1940*. Arctic Scientific Institute of Arctic Sea Route. Council of Ministry USSR: 1-3. [Reprinted 1946, in Trudy ekspedition *Sedov* Moskva-Leningrad **3**: 189-193.]

39. PRASHAD B., 1936. — On the Sipuncula from Indian water in Indian Museum, Calcutta. *Rec. Ind. Mus., Zool. Surv. India*, Calcutta: 231-238.

40. QUATREFAGES M.A. DE, 1865b. — Gephyriens Inermes. *Histoire Naturelle des Annelés Marins et d'Eau Douce*, Paris **2** : 599-632.

41. SAIZ SALINAS J. I., 1993. — Sipuncula from Réunion Island (Indian Ocean). *J. Nat. Hist.* **27**: 535-555.

42. — 1995. — Sipuncula of the southeastern Weddell Sea (Antarctica). *Polar Biol.* **15**: 307-317.

43. SELENKA E., 1885. — Report on the Gephyrea collected by H.M.S. *Challenger* during 1873-76. *Report of scientific results of the Voyage of Challenger*, Zoology **13** (36): 1-25.

44. SELENKA E., MAN J. G. DE & BÜLOW C., 1883. — Die Sipunculiden, eine systematische Monographie. *Reisen in Archipel Phillippinen von Dr. C. Semper*, Weisbaden **2 4**: 1-131.

45. SHIPLEY A. E., 1902. — Sipunculoidea, with an account of a new genus *Lithacrosiphon*. *In* J. S. GARDINER (ed.). *Fauna and geography of the Maldive and Laccadive archipelagoes*. Cambridge, Cambridge University Press: 131-140.

46. — 1903. — Report on the Gephyrea collected by Prof. Herdman at Ceylon in 1902. *Ceylon Pearl Oyster Fish. Suppl. Rep.* **3**: 169-176.

47. SLUITER C. P., 1902. — Die Sipunculiden und Echiuriden der *Siboga* Expedition, nebst Zusammenstellung der Ueberdies aus den indischen Archipel bekannten Arten. *Siboga Expeditie*, Monographie **25**: 1-53.

48. SOUTHERN R., 1913. — Gephyrea of the coasts of Ireland. *Scientific Investigations of the Fisheries Branch, Department of Agriculture for Ireland* **3**: 1-46.

49. STEPHEN A. C., 1942. — The South African intertidal zone and its relation to ocean currents. Notes on the intertidal sipunculids of Cape Province and Natal. *Ann. Natal Mus.* **10** (2): 245-256.

50. — 1948. — Sipunculids. *British, Australian, New Zealand Antarctic Research Expedition Reports*, ser. B **5** (4): 213-220.

51. — 1968. — Sipuncula and Echiura from Nouvelle-Caledonie. *Cahiers du Pacifique* **10**: 44-50.

52. STEPHEN A. C. & CUTLER E. B., 1969. — On a collection of Sipuncula, Echiura, and Priapulida from South African waters. *Trans Roy. Soc. South Africa* **38**: 111-121.

53. STEPHEN A. C. & EDMONDS S. J., 1972. — The phyla Sipuncula and Echiura. London, *Trustees of the British Museum (Natural History)*, 528 p.

54. STEPHEN A. C. & ROBERTSON J. D., 1952. — A preliminary report on the Echiuridae and Sipunculidae of Zanzibar. *Proc. Roy. Soc. Edinb.* **64** (4): 426-444.

55. THÉEL H., 1911. — Priapulids and sipunculids dredged by the Swedish Antarctic expedition 1901-1903 and the phenomenon of bipolarity. *K. Svenska Vet Akad Handl.* **47** (1): 3-36.

56. WESENBERG-LUND E., 1959a. — Sipunculoidea and Echiuroidea from Mauritius. *Vidensk. Medd. Dansk nat. hist. Foren. Kobenh.* **121**: 53-73.

57. — 1959b. — Sipunculoidea and Echiuroidea from Tropical West Africa. *Atlantide Report* **5**: 177-210.

58. — 1963. — South African sipunculids and echiuroids from coastal waters. *Vidensk. Medd. Dan. nat. hist. Foren. Kobenh.* **125**: 101-146.

Source : MNHN, Paris

APPENDIX — STATION DATA

Genera and species arranged alphabetically. Within species, stations arranged by longitude from West to East. Source code: 42 = Guille, 50 = Dellacroix, 52 = SAFARI, 55 = BENTHEDI, 75 = JASUS, 77 = Gout.

Antillesoma antillarum

LATIT (S)	LONGIT (E)	DEPTH (M)	NUMB IND.	SORC	YR	STATION
1245	04517	0008	1	55	77	R16
2130	05610	0030	1	50	80	49
2130	05610	0001	1	50	80	201
2130	05610	0001	2	50	80	202
2130	05610	0001	1	50	80	3

Apionsoma misakianum

1233	04456	0025	1	55	77	S79
1254	04458	0015	2	55	77	S51
1242	04459	0038	3	55	77	S65
1304	04509	0033	5	55	77	S46
1243	04510	0002	7	77	86	1R
1242	04510	0007	2	77	86	8C
1247	04512	0018	1	77	83	B1
1247	04512	0018	1	77	83	B2
1247	04512	0019	1	77	83	B3
1247	04512	0023	1	77	83	G1
1247	04512	0018	2	77	86	B2
1254	04516	0340	24	55	77	S33
1252	04516	0030	5	55	77	S36
1225	04616	0020	1	55	77	R106
1222	04628	0013	4	55	77	S116
1125	04719	0026	6	55	77	DS101
1132	04723	0024	3	55	77	6124
2130	05610	0015	1	50	80	103
2130	05610	0001	1	50	80	202
2130	05610	0001	2	50	80	212
2220	16630	0028	1	77	85	3
2220	16630	0014	5	77	85	8B
2220	16630	0014	4	77	85	8C
2220	16630	0009	1	77	85	20B
2220	16630	0012	14	77	85	28A
2220	16630	0008	1	77	85	47C
2220	16630	0010	36	77	85	48B
2220	16630	0010	4	77	85	48C
2220	16630	0011	22	77	85	63B
2220	16630	0022	7	77	85	67A
2220	16630	0022	24	77	85	67B

Apionsoma murinae murinae

1254	04454	0750	1	55	77	DS52
1248	04457	0700	6	55	77	DS58
1241	04457	0815	13	55	77	DS64
1129	04718	0250	4	55	77	DR8
1236	04738	1125	2	55	77	DS3
3824	07729	1430	11	75	86	36
3740	07731	2200	5	75	86	5
0540	07833	3600	1	52	81	202

Apionsoma murinae bilobatae

1254	04516	0625	66	55	77	DR37
1255	04516	0350	2	55	77	DR38

Apionsoma trichocephalus

1254	04458	0032	5	55	77	S50
1243	04510	0002	2	77	86	1C
1243	04510	0027	1	77	86	2B
1247	04512	0009	3	77	83	A1
1247	04512	0009	2	77	83	A2
1247	04512	0009	7	77	83	A3
1247	04512	0018	2	77	83	B2
1246	04512	0022	15	77	83	D1
1246	04512	0022	12	77	83	D2
1246	04512	0022	7	77	83	D3
1247	04512	0023	1	77	83	G1
1247	04512	0013	74	77	86	A1
1247	04512	0013	31	77	86	A2
1247	04512	0013	61	77	86	A3
1247	04512	0021	1	77	86	G3
1252	04516	0007	1	55	77	S39
1225	04616	0024	3	55	77	S110
1222	04628	0005	15	55	77	S117
2220	16630	0022	2	77	85	16A
2220	16630	0019	5	77	85	19A
2220	16630	0019	32	77	85	19B
2220	16630	0015	1	77	85	38A
2220	16630	0008	3	77	85	47C

Aspidosiphon elegans

2130	05610	0001	1	50	80	31
2130	05610	0001	2	50	80	201
2130	05610	0001	21	50	80	202
2130	05610	0001	1	50	80	203
2130	05610	0001	2	50	80	206

Aspidosiphon gracilis

1243	04510	0002	1	77	86	1B
1242	04510	0025	1	77	86	6B
1247	04512	0018	1	77	86	B2
2220	16630	0016	3	77	85	29A

Aspidosiphon laevis

2220	16630	0012	1	77	85	28A
2220	16630	0011	3	77	85	63B

Source : MNHN, Paris

LATIT (S)	LONGIT (E)	DEPTH (M)	NUMB IND.	SORC	YR	STATION
Aspidosiphon muelleri						
1254	04454	0750	1	55	77	DB52
1246	04458	0530	19	55	77	DS62
1229	04502	0450	8	55	77	DS71
1231	04502	0325	8	55	77	DS72
1305	04508	0400	3	55	77	DK41
1305	04508	0460	1	55	77	DS42
1242	04510	0025	1	77	86	6A
1242	04510	0025	4	77	86	6B
1242	04510	0025	4	77	86	6C
1242	04510	0027	1	77	86	7B
1242	04510	0027	8	77	86	7C
1247	04512	0018	2	77	83	B2
1246	04512	0022	1	77	83	D1
1246	04512	0020	1	77	86	D3
1247	04512	0021	1	77	86	G2
1247	04512	0009	2	77	83	A3
1238	04512	0675	1	56	77	DK27
1254	04516	0340	4	55	77	DR33
1255	04516	0350	44	55	77	DR38
1254	04516	0500	1	55	77	DR34
1245	04516	0015	16	55	77	S1B
1246	04516	0006	8	55	77	S23
1254	04516	0340	1	55	77	S33
1252	04516	0030	1	55	77	S36
1242	04520	0705	1	55	77	DK28
1222	0462B	0005	1	55	77	S117
1132	04716	0515	666	55	77	DS93
1132	04716	0450	81	55	77	DS94
1129	0471B	0250	7B	55	77	DK8
1125	04719	0026	2	55	77	DS101
1126	04722	0440	28	55	77	DK104
1131	04723	0620	16	55	77	DS122
1132	04723	0024	1	55	77	S124
1130	04724	0361	330	55	77	DS120
1236	0473B	1125	1	55	77	DS3
4930	07006	0031	4	42	72	19SMK
3845	07722	0465	1	75	86	2B
3846	07729	0315	2	75	86	1B
383B	07733	0525	1	75	86	33
3841	07733	0135	2	75	86	35
3753	07737	0575	1	75	86	12
2220	16630	0028	2	77	85	3
2220	16630	0022	1	77	85	16A
2220	16630	0022	2	77	85	16B
2220	16630	0016	3	77	85	29A
2220	16630	0016	1	77	85	29B
2220	16630	0016	2	77	85	29C
2220	16630	0015	2	77	85	38A
2220	16630	0010	1	77	85	58A
2220	16630	0022	16	77	85	67A
2220	16630	0022	14	77	85	67B
Aspidosiphon spiralis						
2220	16630	0022	1	77	85	16A
2220	16630	0022	3	77	85	16B
2220	16630	0019	1	77	85	19A
2220	16630	0013	10	77	85	27B
2220	16630	0016	6	77	85	29A
2220	16630	0016	2	77	85	29B
2220	16630	0016	1	77	85	29C
2220	16630	0022	1	77	85	67A
Aspidosiphon steenstrupii						
1245	0451B	0020	1	55	77	R32
2130	05610	0020	1	50	80	24
2130	05610	0001	1	50	80	25
2130	05610	0001	2	50	80	31
2130	05610	0020	1	50	80	100
2130	05610	0001	1	50	80	102
2130	05610	0001	2	50	80	202
2130	05610	0001	2	50	80	203
2130	05610	0001	2	50	80	212
Aspidosiphon thomassini						
1243	04510	0002	5	77	86	1A
1243	04510	0002	1	77	86	1B
1243	04510	0002	2	77	86	1C
1246	04512	0003	1	77	86	E1
1254	04516	0340	5	55	77	S33
2220	16630	0019	1	77	85	19A
2220	16630	0019	2	77	85	19B
Aspidosiphon zinni						
3740	07731	2200	4	75	86	5
Cloeosiphon aspergillus						
2130	05610	0030	2	50	80	18
2130	05610	0030	1	50	80	49
2130	05610	0001	1	50	80	201
2130	05610	0001	2	50	80	202
Golfingia margaritacea						
4659	03747	0192	2	42	76	BB157
4650	03751	0110	84	42	76	BB168
4652	03752	0031	16	42	76	BB125
4656	03754	0095	109	42	76	BB79
4653	03754	0110	24	42	76	BB97
4650	03756	0138	8	42	76	B6108
4658	03800	0204	10	42	76	BB88
4646	03803	0190	1	42	76	BB111
4617	04937	0275	10	42	76	B6273
4603	04946	0267	12	42	76	BB250
4625	05033	0192	4	42	76	BB291
4837	06831	0125	3	42	75	F52-DC120
4841	06839	0104	1	42	75	F58-DC140
4841	06902	0018	1	42	75	G60-DC141
4841	06902	0017	1	42	75	BB143-G60
4801	06904	0177	1	42	75	G65-DC155
4841	06904	0050	3	42	75	BB148-G61
4821	06909	0140	1	42	75	G64-DC154
4904	06921	0043	23	42	75	BB187-G79
4858	06928	0230	BB	42	75	BB193-G81
4933	06940	0058	5	42	75	BB21-B10
4920	06944	004B	1	42	74	3108MK
4944	06945	0103	1	42	75	B14-DC36
4930	06946	0025	2	42	72	618MK
4927	06947	0102	3	42	72	53SMK
4931	06947	0042	1	42	72	116BMK
4933	06948	0023	2	42	72	112SMK
4910	06952	0071	20	42	74	325SMK
4911	06953	0050	6	42	74	323SMK
4935	06953	0036	1	42	72	92SMK

Source : MNHN, Paris

LAT1T (S)	LONG1T (E)	DEPTH (M)	NUMB IND.	SORC	YR	STATION
4938	06955	0028	2	42	72	96SMK
4908	06957	0050	11	42	75	BB201-H84
4935	06958	0045	6	42	72	33SMK
4931	07000	0025	1	42	72	28BMK
4934	07000	0020	2	42	72	29SMK
4935	07000	0023	2	42	72	37SMK
4935	07000	0033	5	42	72	38SMK
4855	07000	0106	1	42	75	BB211-H87
4935	07001	0045	1	42	72	31SMK
4938	07001	0088	2	42	72	101SMK
4931	07003	0060	3	42	72	12SMK
4939	07004	0058	6	42	72	104SMK
4920	07006	0028	10	42	72	87SMK
4838	07006	0105	2	42	75	BB216-B89
4940	07006	0034	1	42	72	106SMK
4942	07006	0036	1	42	72	107SMK
4920	07007	0032	2	42	72	73SMK
4918	07007	0024	1	42	72	74SMK
4942	07007	0088	1	42	72	108SMK
4922	07008	0032	6	42	72	80SMK
4922	07008	0040	1	42	72	81SMK
4931	07009	0095	1	42	72	14SMK
4821	07009	0128	10	42	75	B8219/20-8
4932	07010	0065	2	42	72	13SMK
4920	07010	0027	5	42	72	85SMK
4920	07010	0030	6	42	72	148SMK
4920	07010	0030	5	42	72	149SMK
4928	07011	0065	2	42	72	3SMK
4930	07011	0020	2	42	72	5SMK
4918	07011	0031	6	42	72	76SMK
4925	07012	0045	7	42	74	215SMK
4920	07012	0025	2	42	74	217SMK
4926	07013	0062	3	42	74	206SMK
4929	07014	0051	10	42	72	10SMK
4744	07014	0163	1	42	75	B93-CP226
4926	07014	0060	1	42	74	205SMK
4922	07014	0022	1	42	74	219SMK
4918	07015	0032	2	42	74	256SMK
4928	07016	0044	8	42	72	124SMK
4927	07018	0040	15	42	72	125BMK
4926	07018	0044	5	42	72	126SMK
4930	07019	0042	3	42	72	134SMK
4934	07019	0027	1	42	72	138SMK
4929	07022	0044	5	42	75	A2-DC4
4727	07024	0170	1	42	75	BB230-B96
4929	07033	0075	1	42	75	A2-DC6
4903	07041	0076	1	42	75	I108-CP261

Golfingia muricaudata

4658	03800	0204	11	42	76	BB88
1231	04502	0325	5	55	77	DS72
1305	04508	0460	1	55	77	DS42
1238	04512	0675	10	55	77	DR27
1144	04735	3716	2	55	77	C887
4859	08708	0315	2	42	75	E47-DC108
4811	06742	0275	1	42	75	8B132-P55
4858	06928	0230	37	42	75	BB193-G81
3846	07729	0315	3	75	86	18
3824	07729	1430	3	75	86	38
3838	07733	0525	1	75	86	33
3747	07740	1685	2	75	86	2
0537	07824	3660	2	52	81	219

Golfingia pectinatoides

1132	04723	0024	3	55	77	B124

Nephasoma constrictum

1255	04516	0350	8	55	77	DR38
0659	07850	2540	2	52	81	305
0707	07900	2475	1	52	81	304
0829	07919	1095	5	52	81	407
0143	08708	4350	1	52	81	810

Nephasoma cutleri

4656	03754	0095	14	42	76	BB79
4650	03756	0138	17	42	76	BB108
4658	03800	0204	3	42	76	8888
1254	04454	0750	1	55	77	DS52
0537	07824	3660	4	52	81	219

Nephasoma diaphanes

4659	03747	0192	4	42	76	BB157
4650	03751	0110	27	42	76	B8168
4652	03752	0031	24	42	76	B8125
4656	03754	0095	19	42	74	8879
4645	03803	0190	2	42	76	8B111
1254	04454	0750	2	55	77	DS52
1248	04457	0700	1	55	77	DB58
1305	04508	0460	3	55	77	DS42
1238	04512	0675	2	55	77	D827
1254	04516	0340	6	55	77	DR33
1254	04516	0625	7	55	77	DR37
1255	04516	0350	17	55	77	DR38
1256	04518	1390	25	55	77	DR40
1132	04716	0450	1	55	77	DS94
1129	04718	0250	3	55	77	DB8
1144	04730	3700	85	55	77	C890
1144	04735	3716	230	55	77	C887
4617	04937	0275	16	42	76	BB273
4600	04958	0215	1	42	76	BB253
4557	05021	0143	1	42	76	BB236
4645	05029	1230	10	42	76	8B281
4625	05033	0192	7	42	76	BB291
4552	05035	0145	7	42	76	8B218
4618	05048	0210	6	42	76	BB297
4619	05130	0375	1	42	76	8B183
5004	06829	0195	1	42	75	C24-D858
4904	06921	0043	1	42	75	8B187-G79
4951	07020	0145	8	42	75	BB270-J113
4955	07024	0168	1	42	75	BB273-J114
3848	07727	0975	2	75	86	20
3846	07729	0315	6	75	86	18
3824	07729	1430	5	75	86	36
3740	07731	2200	16	75	86	5
3755	07732	0262	4	75	86	15
3848	07735	0450	1	75	86	21
3755	07739	1200	1	75	86	13
0537	07824	3660	1	52	81	0219
0603	07933	5175	3	52	81	2718
0141	08706	4420	4	52	81	803

Onchnesoma magnibathum

3152	04829	3825	1	52	79	1508
0141	08706	4420	1	52	81	803

Onchnesoma squamatum

1231	04502	0325	12	55	77	DS72

Source : MNHN, Paris

LATIT (S)	LONGIT (E)	DEPTH (M)	NUMB IND.	SORC	YR	STATION

Onchnesoma steenstrupii

1248	04457	0700	20	55	77	DS58
1241	04457	0815	3	55	77	DS64
1231	04502	0325	23	55	77	DS72
1238	04512	0675	7	55	77	DS27
1254	04516	0340	4	55	77	DS33
1254	04516	0625	87	55	77	DR37
1255	04516	0350	1	55	77	DS38

Phascolion convestitum

1242	04510	0027	1	77	86	7C
2220	16630	0028	4	77	85	3
2220	16630	0016	2	77	85	29A
2220	16630	0010	1	77	85	48B

Phascolion hibridum

3848	07727	0975	37	75	86	20
3835	07736	0925	9	75	86	34

Phascolion lucifugax

1242	04510	0025	1	77	86	6A
1242	04510	0025	1	77	86	6B
1242	04510	0025	1	77	86	6C
1222	04628	0005	1	55	77	S117

Phascolion lutense

3152	04829	3825	1	52	79	8
3848	07727	0975	9	75	86	20
3824	07729	1430	1	75	86	36
3740	07731	2203	17	75	86	5

Phascolion strombus

1254	04516	0625	17	55	77	DR37
1255	04516	0350	304	55	77	DS38
1256	04518	1390	3	55	77	DS40
1129	04718	0250	2	55	77	DS8
4930	07006	0031	1	42	72	196MK
4648	07030	1218	3	42	75	898-CP243
4653	07033	0920	1	42	75	88241-897
4832	07119	1390	1	42	75	88260-I107

Phascolion tuberculosum

1247	04512	0023	2	77	83	G3
1125	04719	0026	29	55	77	DS101
1126	04722	0440	8	55	77	DS104
3846	07729	0315	1	75	86	18
3755	07732	0262	1	75	86	15
2220	16630	0022	1	77	85	16A
2220	16630	0022	4	77	85	16B

Phascolosoma nigrescens

1252	04516	0030	1	55	77	S36
1225	04616	0020	2	55	77	S106
1225	04616	0024	2	55	77	S110
2130	05610	0001	1	50	80	3
2130	05610	0001	1	50	80	25
2130	05610	0001	1	50	80	31
2130	05610	0001	1	50	80	102
2130	05610	0015	1	50	80	103
2130	05610	0001	3	50	80	201
2130	05610	0001	1	50	80	211
2220	16630	0009	1	77	85	208

Phascolosoma noduliferum

3752	07729	0090	4	75	86	7
3747	07734	0075	7	75	86	3

Phascolosoma scolops

1225	04616	0024	1	55	77	S110
1125	04719	0026	4	55	77	DS101
2130	05610	0001	2	50	80	1
2130	05610	0001	1	50	80	5
2130	05610	0001	3	50	80	9
2130	05610	0001	4	50	80	31
2130	05610	0001	3	50	80	102
2130	05610	0001	2	50	80	201
2130	05610	0001	6	50	80	202
2130	05610	0001	3	50	80	203

Phascolosoma stephensoni

2130	05610	0001	1	50	80	1
2130	05610	0001	1	50	80	7

Sipunculus nudus

1254	04458	0032	34	55	77	S50
1254	04458	0015	5	55	77	S51
1242	04459	0038	13	55	77	S65
1304	04509	0033	2	55	77	S46
1237	04510	0018	26	55	77	S24
1246	04516	0006	2	55	77	S23
1254	04516	0340	5	55	77	S33
1252	04516	0030	2	55	77	S36
1252	04516	0007	2	55	77	S39
1226	04616	0024	1	55	77	S111
1222	04624	0020	3	55	77	S15
1222	04628	0013	19	55	77	S116
1222	04628	0005	8	55	77	S117
1132	04723	0024	11	55	77	S124
1130	04723	0007	1	55	77	S125

Source : MNHN, Paris

Source : MNHN, Paris

Bulletin du Muséum national d'Histoire naturelle, Paris, 4e série, **18**, 1996
Section A, nos 3-4 : 367-385

Morphogenèse d'*Heligmosomoides polygyrus polygyrus* (Dujardin, 1845) (Trichostrongylina, Heligmosomoidea) chez *Apodemus flavicollis* en France. Comparaison avec les espèces proches : *Heligmosomoides laevis* (Dujardin, 1845) et *Heligmosomum mixtum* Schulz, 1954, parasites d'Arvicolidae

par Gabriel N'ZOBADILA, Johnny BOYER & Marie-Claude DURETTE-DESSET

Résumé. — Seulement trois espèces d'Heligmosomidae sont communes dans la faune de France : *Heligmosomoides laevis* parasite de *Microtus arvalis*, *Heligmosomoides polygyrus polygyrus* parasite d'*Apodemus* spp. et de *Mus musculus*, *Heligmosomum mixtum* parasite de *Clethrionomys glareolus*. La morphogenèse de ces trois espèces est décrite chez leurs hôtes naturels respectifs. La morphogenèse larvaire ne confirme pas la position phylétique des adultes puisque les synlophes de la L_4 d'*Heligmosomoides laevis* et d'*Heligmosomum mixtum* sont comparables et s'opposent à ceux d'*Heligmosomoides polygyrus polygyrus* et d'*Heligmosomoides yamagutii*. Les deux genres *Heligmosomoides* (crêtes longitudinales) et *Heligmosomum* (crêtes obliques sur au moins une des quatre faces du corps) sont donc extrêmement proches. Nous pensons donc que la nouvelle subdivision du genre *Heligmosomum* en deux sous-genres, *Heligmosomum* et *Pseudoheligmosomum*, ne peut être acceptée, d'autant plus que l'espèce-type du sous-genre *Pseudoheligmosomum* a été mal identifiée : en effet, *Heligmosomum mixtum sensu* Asakawa et Satoh, 1987, n'est pas l'espèce de Schulz (1954). Nous proposons de la nommer *Heligmosomum asakawai* n.sp.

Mots-clés. — *Heligmosomoides*, *Heligmosomum*, Nematoda, Trichostrongylina, Rongeurs, zone paléarctique, morphogenèse.

Morphogenesis of *Heligmosomoides polygyrus polygyrus* (Dujardin, 1845) (Trichostrongylina, Heligmosomoidea), a parasite of *Apodemus flavicollis* in France. Comparison with related species: *Heligmosomoides laevis* (Dujardin, 1845) and *Heligmosomum mixtum* Schulz, 1954, parasites of Arvicolidae

Abstract. — Only three species of the Heligmosomidae are common in France. *Heligmosomoides laevis*, a parasite of *Microtus arvalis*, *Heligmosomoides polygyrus polygyrus*, a parasite of *Apodemus* spp. and *Mus musculus*, and *Heligmosomum mixtum*, a parasite of *Clethrionomys glareolus*. The morphogenesis of these three species is studied in their respective natural hosts. The larval morphogenesis does not confirm the current phyletic position of the adults, since the synlophes of *Heligmosomoides laevis* and *Heligmosomum mixtum* fourth stage larvae are similar and differ from those of *Heligmosomoides polygyrus polygyrus* and *Heligmosomum yamagutii*. Therefore, the two genera, *Heligmosomoides* (longitudinal ridges) and *Heligmosomum* (oblique ridges on at least one quarter of the body), are very closely related. The subdivision of the genus *Heligmosomum* into two subgenera cannot be accepted since the type species of *Pseudoheligmosomum* was not identified correctly: in fact, *Heligmosomum mixtum sensu* Asakawa and Satoh, 1987 is not the species as described by Schulz (1954). We propose to name it *Heligmosomum asakawai* n.sp.

Key-words. — *Heligmosomoides*, *Heligmosomum*, Nematoda, Trichostrongylina, rodents, Palaearctic region, morphogenesis.

G. N'ZOBADILA, J. BOYER & M.-C. DURETTE-DESSET, *Muséum national d'Histoire naturelle, Laboratoire de Biologie parasitaire, Protistologie, Helminthologie, associé au CNRS (URA 114), 61 rue de Buffon, F-75231 Paris cedex 05*

Source : MNHN, Paris

INTRODUCTION

Sur les quarante-six cycles réalisés chez les Trichostrongylina, seulement sept sont connus chez les Heligmosomoidea (*cf.* DURETTE-DESSET & CHABAUD 1993), qui représentent la sous-famille morphologiquement la plus évoluée de tous les Trichostrongles. La plupart de ces cycles concernent des Heligmonellidae, sous-famille des Nippostrongylinae parasites de Rongeurs Myomorphes. Actuellement seuls deux cycles biologiques sont connus chez les Heligmosomidae : celui d'*Heligmosomoides polygyrus bakeri* Durette-Desset *et al.*, 1972, parasite de *Mus musculus* et de Cricetidae en zone néarctique, décrit brièvement pour la première fois par Spurlock (1943), et celui d'*Heligmosomoides kurilensis kobayashii*, parasite d'*Apodemus speciosus* au Japon, décrit par Asakawa (1987). Dans les deux cas, les cycles ont été réalisés chez des animaux d'origine expérimentale, souris de laboratoire (*Mus musculus)* pour le premier, souris de laboratoire et mérions (*Meriones unguiculatus)* pour les seconds, ces derniers étant des hôtes inhabituels. *Heligmosomoides polygyrus bakeri* est d'après DURETTE-DESSET *et al.* (1972), une des deux sous-espèces américaines d'*Heligmosomoides polygyrus polygyrus* (Dujardin, 1845), parasite d'*Apodemus* spp. et plus exceptionnellement de la *Mus musculus* en Europe. Dès 1971, FORRESTER avait noté qu'il existait une différence entre les deux populations, européenne et américaine. Ce n'est qu'en 1983 qu'HASEGAWA *et al.* ont clairement exprimé que les très nombreux travaux réalisés sur *Heligmosomoides polygyrus* (= *Nematospiroides dubius* Baylis, 1926) concernaient, non pas la sous-espèce européenne *Heligmosomoides polygyrus polygyrus*, mais la sous-espèce américaine *Heligmosomoides polygyrus bakeri*. La souche, nommée « souche 50 » par FORRESTER (1971) a été isolée par EHRENFORD en 1950 à partir d'œufs trouvés dans les fèces de *Peromyscus maniculatus* en Californie (voir EHRENFORD 1954). Depuis 1950, elle a été entretenue sur souris de laboratoire et distribuée dans le monde entier.

C'est probablement une des raisons pour lesquelles les travaux concernant *Heligmosomoides polygyrus polygyrus* sont restés très fragmentaires. Seule la phase libre du cycle a été étudiée en détail par ROMAN (1951) puis FAHMY (1956). Rappelons cependant que ce sont ELTON *et al.* (1931) qui ont découvert les premiers, chez *Apodemus sylvaticus* en Angleterre, la présence de pseudokystes contenant des *Heligmosomoides polygyrus polygyrus*. Or la présence de ces pseudokystes paraît caractéristique du cycle des Heligmosomidae.

Enfin, très récemment, BROWN *et al.* (1994) ont étudié le rythme de production des œufs d'*Heligmosomoides polygyrus polygyrus* chez *Apodemus sylvaticus*.

Il nous a donc paru intéressant d'étudier de façon approfondie le cycle biologique d'*Heligmosomoides polygyrus polygyrus* avec un double objectif :

— *Heligmosomoides polygyrus polygyrus* est une des rares espèces d'Heligmosomidae qui parasite des Muridae et non des Arvicolidae[1]. Nous avons donc cherché à situer cette espèce systématiquement et biologiquement par rapport aux deux autres espèces d'Heligmosomidae les plus communes en France, *Heligmosomoides laevis* (Dujardin, 1845) et *Heligmosomum mixtum* (Schulz, 1954), toutes deux parasites d'Arvicolidae.

1. L'espèce a été signalée à différentes reprises chez des Arvicolidae en Europe occidentale mais il pourrait s'agir d'erreurs d'identification comme le suggèrent QUINNEL *et al* (1991).

Source : MNHN, Paris

— Récemment des études comparatives d'immunité croisée et de variabilité génétique entre *Heligmosomoides polygyrus polygyrus* et sa sous-espèce américaine *Heligmosomoides polygyrus bakeri* ont été réalisées (QUINELL *et al.* 1991 ; ABU-MADI *et al.* 1994). Nous avons donc cherché à savoir s'il existait des différences entre la biologie d'*Heligmosomoides polygyrus polygyrus* et celle d'*Heligmosomoides polygyrus bakeri.*

Pour réaliser ces deux objectifs, nous avons choisi de travailler avec les hôtes naturels de ces différentes espèces. L'objet du présent travail concerne l'étude de la morphogenèse d'*Heligmosomoides polygyrus polygyrus* comparée à celles d'*Heligmosomoides laevis* et d'*Heligmosomum mixtum.*

MATÉRIEL ET MÉTHODES

LES HÔTES

Les cycles biologiques des trois espèces de la faune de France ont été établis chez des hôtes naturels sains, en élevage au laboratoire. Les hôtes infestés naturellement ont fourni les fèces contenant les œufs donnant les larves de Trichostrongles : *Apodemus flavicollis* Melchior, 1834 pour le cycle d'*Heligmosomoides polygyrus polygyrus, Microtus arvalis* Pallas, 1779 pour le cycle d'*Heligmosomoides laevis* et *Clethrionomys glareolus* Schreber, 1780 pour celui d'*Heligmosomum mixtum.*

LES COPROCULTURES

Les coprocultures sont faites à partir des œufs se trouvant dans les fèces d'animaux rapportés de Septfontaines (Doubs-France). Deux méthodes de coproculture ont été utilisées pour obtenir les stades larvaires libres : la méthode de BRUMPT (1922), modifiée par DURETTE-DESSET & CASSONE (1987), qui permet d'obtenir directement des larves infestantes, récoltées une à une à la pipette, comptées et conservées à l'étuve à 22 °C dans de l'eau à pH neutre et la méthode d'HUBERT & KERBŒUF (1984), qui permet d'étudier la morphogenèse des stades libres.

MODES D'INFESTATION

Tous les rongeurs sont infestés par voie buccale en dose unique avec des larves 3 engainées. Les larves sont concentrées dans un petit volume d'eau et aspirées à l'aide d'une seringue munie d'une aiguille à embout recourbé, constituant une sonde au moyen de laquelle elles sont injectées dans l'estomac du rongeur.

Les *Apodemus* sont infestés avec 150 larves d'*Heligmosomoides polygyrus polygyrus* âgées de une à trois semaines, les *Microtus* avec 100 larves d'*Heligmosomoides laevis* âgées de quatre à douze jours, et les *Clethrionomys* avec 100 larves d'*Heligmosomum mixtum*, âgées de six à seize jours. La disparité du nombre et de l'âge des larves infestantes inoculées est due au fait que ces deux paramètres sont fonction du matériel disponible (hôtes sains et larves infestantes).

Source : MNHN, Paris

Recherche et récolte des parasites

Les stades libres proviennent du développement des œufs mis en culture. Ils sont recueillis à midi, puis tous les jours de J_1 à J_6. Les larves obtenues à ces dates sont mises entre lame et lamelle, légèrement chauffées à la flamme pour permettre leur extension et leur immobilisation. Elles sont ensuite dessinées à frais.

Les stades parasites sont recueillis par autopsie des rongeurs infestés expérimentalement. Lors de l'autopsie, les différents organes, foie, poumons, cœur, estomac et intestin grêle sont prélevés et dilacérés dans de l'eau physiologique. L'intestin est coupé en quatre parties de longueurs équivalentes (notées Int_1, Int_2, Int_3 et Int_4) du duodénum jusqu'au cæcum. Les vers sont récoltés sous la loupe, comptés et fixés à l'éthanol 70° bouillant dans lequel ils sont conservés.

L'étude du synlophe est faite selon la méthode de Durette-Desset (1985).

Symboles utilisés

L_1	larve du premier stade ;
L_2	larve du deuxième stade ;
(L_3)	larve 3 engainée dans la cuticule de la L_2 ;
L_3	larve du troisième stade ;
(L_4)	larve 4 engainée dans la cuticule de la L_3 ;
L_4	larve du quatrième stade ;
(Im)	ver immature ou juvénile, enfermé dans la cuticule de la L_4 ;
Im	ver immature ou juvénile ;
Ad	adulte.

RÉSULTATS

Description et identification des stades larvaires libres

Chez les trois espèces, les deux premiers stades sont très proches morphologiquement et sont différenciés principalement par leur taille. De plus entre la L_1 et la L_2, chez *Heligmosomoides laevis*, l'ébauche génitale grandit notablement (Fig. 1), chez *Heligmosomoides polygyrus polygyrus*, les renflements cuticulaires latéraux ont une forme différente (Fig. 2F, G) et, chez *Heligmosomum mixtum*, la queue de la L_2 est beaucoup plus longue (Fig. 3A, B). Le troisième stade se reconnaît par sa double cuticule puisqu'il reste enfermé dans la cuticule du deuxième stade. Les sexes des stades libres ne peuvent pas être déterminés.

Les trois stades larvaires ont un pharynx bien différencié. L'œsophage est rhabditoïde chez la L_1 et la L_2, et strongyloïde chez la (L_3). L'anneau nerveux est situé au milieu de la longueur de l'œsophage. Les deirides ne sont visibles que chez les larves d'*Heligmosomoides polygyrus polygyrus* (Fig. 2E), le pore excréteur n'apparaît généralement que chez la larve 3. L'ébauche génitale est située légèrement en arrière du milieu du corps.

Les principales mensurations des stades libres sont données dans le tableau 1 pour *Heligmosomoides laevis*, le tableau 2 pour *Heligmosomoides polygyrus polygyrus* et le tableau 3 pour *Heligmosomum mixtum*.

Source : MNHN, Paris

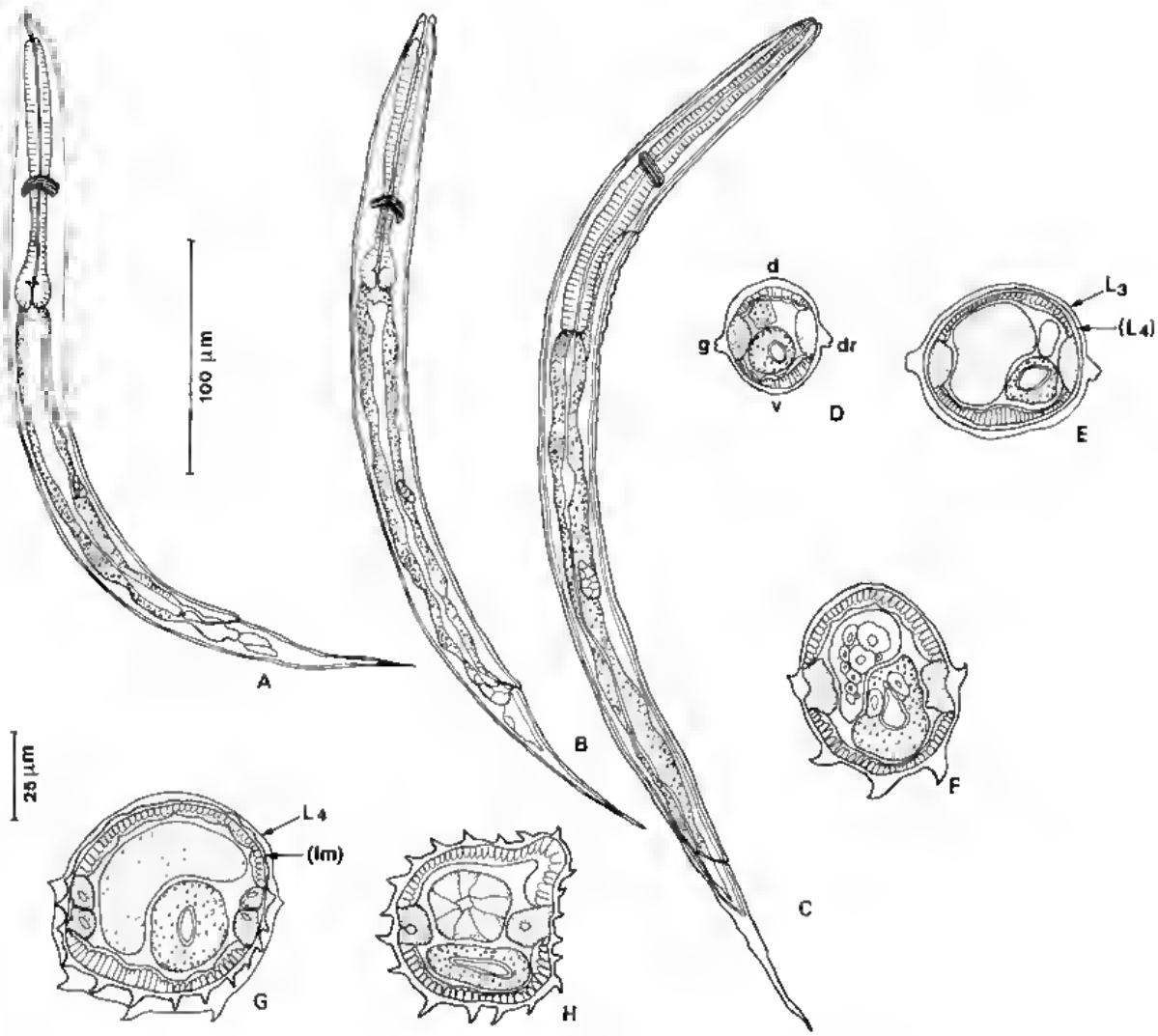


FIG. 1. — *Heligmosomoides laevis* (Dujardin, 1845). A-C : stades larvaires libres en vue latérale droite. A, L_1 à J_1. B, L_2 à J_3. C, (L_3) à J_4. D-H : stades larvaires parasites et immatures, coupes transversales au milieu du corps. D, L_3 mâle à J_3. E, (L_4) mâle à J_4, le syulophe de la L_4 n'est pas encore formé. F, L_4 mâle à J_4. G, (Im) femelle à J_6. H, Im. femelle à J_7. Toutes les coupes de corps sont orientées comme la figure D. d, dos ; v, ventre ; g, gauche ; dr, droite ; (L_3), larve 3 enfermée dans la cuticule de la L_2 ; (L_4), larve 4 enfermée dans la cuticule de la L_3 ; (Im), ver immature enfermé dans la cuticule de la L_4. Échelles : A-C : 100 µm, D-H : 25 µm

Source : MNHN, Paris

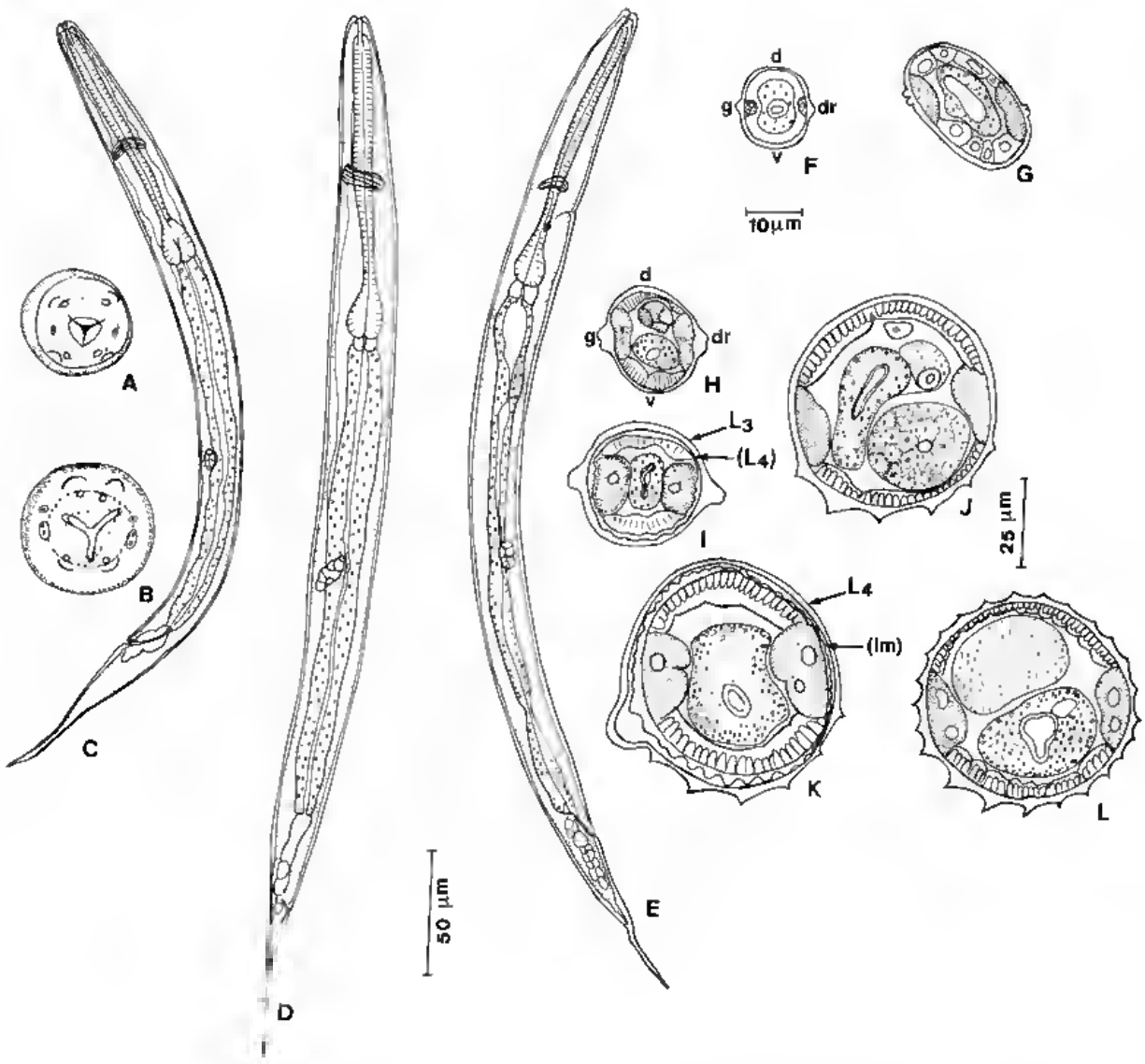


FIG. 2. — *Heligmosomoides polygyrus polygyrus* (Dujardin, 1845). A, L_4 mâle à J_4, tête en vue apicale. B, Im. mâle à J_6, *id* C-E : stades larvaires libres. C, L_1 à J_2, vue latérale gauche. D, L_2 à J_4, vue latérale droite. E, (L_3) à J_6, vue latérale droite. F-L : coupes transversales au milieu du corps. F-G : stades larvaires libres. F, L_1 à J_2. G, L_2 à J_4. H-L : stades larvaires parasites et immatures. H, L_3 femelle à J_3. I, (L_4) femelle à J_5. J, L_4 mâle à J_5. K, (Im) femelle à J_6. L, Im mâle à J_6. Toutes les coupes de corps sont orientées comme la figure F, d, dos ; v, ventre ; g, gauche ; dr, droite. (L_3), Larve 3 enfermée dans la cuticule de la L_2 ; (L_4), Larve 4 enfermée dans la cuticule de la L_3 ; (Im), ver immature enfermé dans la cuticule de la L_4. Échelles : A, B, G-L : 25 µm, C-E : 50 µm, F : 10 µm.

Source : MNHN, Paris

TABLEAU I. — Principales mensurations exprimées en µm des stades libres L_1, L_2, (L_3) d'*Heligmosomoides laevis*.

Jours après mise en culture des œufs	J1	J2	J3	J4
Stades larvaires	L1	L1	L2	(L3)
Nombre de larves mesurées	10	3	5	5
Longueur du corps	366,5 305 - 406	386 360 - 412	433,5 397 - 475	480 402 - 500
Largeur du corps	24,5 22 - 28	26 25 - 28	27 25 - 30	26,5 21 - 32
Hauteur du pharynx	11,5 9 - 13	11,5 8 - 14	14 13 - 15	13 10 - 17
Position anneau nerveux par rapport à la tête	80,5 68 - 108	81 76 - 85	81 70 - 90	79,5 75 - 82
Position pore excréteur par rapport à la tête	-	-	-	79,5 75 - 82
Longueur de l'œsophage	122,5 108 - 148	121,5 115 - 125	135 122 - 148	133 125 - 138
Longueur de l'ébauche génitale	10,5 9 - 14	12 10 - 14	13,5 12 - 16	14,5 13 - 16
Dist. ébauche gén. / queue sur longueur du corps	44,5 39 - 50,5	48,5 47 - 49,5	47,5 45,5 - 52	51 47 - 54
Longueur de la queue	76,5 60 - 87	86,5 85 - 87	96 90 - 110	86,5 82 - 93

IDENTIFICATION ET MORPHOGENÈSE DES STADES LARVAIRES PARASITES ET DES VERS IMMATURES

Identification du sexe

À partir de J_2 après l'infestation et très nettement à J_3, la morphologie et la migration de l'ébauche génitale de la larve 3 deviennent caractéristiques du sexe, l'ébauche migrant plus postérieurement chez la femelle que chez le mâle (Fig. 4A, B; Fig. 5A, B; Fig. 6A, F).

Identification des différents stades

Les L_4 se différencient des L_3 par la disparition du pharynx, l'apparition d'un synlophe problablement liée à l'enroulement du corps, l'apparition d'une épine caudale dans les deux sexes et, de plus, chez le mâle, par le gonflement de la queue.

Les immatures se différencient des L_4 par l'apparition d'une vésicule céphalique, d'un nouveau synlophe et par la différenciation complète des organes génitaux.

Les mues 3 et 4 se font de la même façon dans les deux sexes : la cuticule de la L_4 présente des ondulations ventrales, tandis que celle de l'immature présente d'abord des ondulations dorsales, puis ventrales. Ces ondulations correspondent à la formation des crêtes cuticulaires. Puis, la cuticule, aussi bien chez la L_4 que chez l'immature, se décolle d'abord sur la face ventrale, puis dans la région caudale, la face dorsale et enfin la région apicale par où sortira le ver.

Source : MNHN, Paris

TABLEAU 2. — Principales mensurations exprimées en µm des stades libres L_1, L_2, (L_3) d'*Heligmosomoides polygyrus polygyrus*.

Jours après mise en culture des œufs	J2	J3	J6
Stades larvaires	L1	L2	(L3)
Nombre de larves mesurées	10	5	11
Longueur du corps	494 443 - 546	514 440 -548	522,5 494 - 633
Largeur du corps	28,5 23 - 34	27 25 - 30	27 24 - 36
Hauteur du pharynx	18,5 16 - 20	18 16 - 20	17 15 - 19
Position anneau nerveux par rapport à la tête	91,5 75 - 100	98 81 - 108	104 85 - 130
Position pore excréteur per rapport à la tête	-	-	115,5 95 - 140
Longueur de l'œsophage	147,5 140 - 158	150 144 - 158	179,5 142 - 230
Longueur de l'ébauche génitale	13,5 11 - 20	15 10 - 22	20 12 - 25
Dist. ébauche gén. / queue sur longueur du corps	222,5 167 - 257	229 203 - 250	244 222 - 295
Longueur de la queue	94,5 72 - 102	90,5 87 - 99	93 84 - 100

Morphogenèse

La morphogenèse des stades larvaires parasites et des immatures apparaît sur la Fig. 4 pour *Heligmosomoides laevis*, la Fig. 5 pour *Heligmosomoides polygyrus polygyrus* et la Fig. 6 pour *Heligmosomum mixtum*. Nous ne décrivons ici que le synlophe, les autres caractères étant identiques à ceux décrits chez les Nippostrongylinae (voir DURETTE-DESSET & CASSONE 1987).

Chez la larve 3, il n'y a pas de véritable synlophe, mais la cuticule chez les trois espèces porte deux renflements latéraux bifides qui s'étendent tout le long du corps (Figs 1D, 2H, 3D).

Chez la larve 4, le synlophe est formé de crêtes cuticulaires longitudinales, naissant en arrière de la vésicule céphalique et disparaissant au niveau de l'anus ou à l'emplacement de la vulve chez la femelle et juste en avant de la future bourse caudale chez le mâle. Chez *Heligmosomoides laevis* (Fig. 1F) et *Heligmosomum mixtum* (Fig. 3E), le synlophe larvaire est identique : il est formé de cinq crêtes cuticulaires dont trois ventrales bien développées et deux petites crêtes latérales, droite et gauche. La crête latérale droite étant dirigée en sens inverse des autres crêtes, il existe un axe d'orientation incliné à environ 45° sur l'axe sagittal. Chez *Heligmosomoides polygyrus polygyrus* (Fig. 2J), le synlophe est formé de six crêtes cuticulaires ventrales, dirigées de la droite vers la gauche. Il n'existe pas de crêtes en face de chaque champ latéral, ni d'axe d'orientation.

Source : MNHN, Paris

Chez l'immature, le synlophe formé est celui de l'adulte. Chez *Heligmosomoides laevis*, il comprend dix-sept à vingt-quatre crêtes cuticulaires, dont huit à quinze crêtes dorsales et huit à dix crêtes ventrales (Fig. 1H). Celui d'*Heligmosomoides polygyrus polygyrus* est formé de vingt-quatre à trente-deux crêtes, au nombre de treize à seize sur la face dorsale et de onze à seize sur la face ventrale (Fig. 2L). Celui d'*Heligmosomum mixtum* est formé de vingt et une à vingt-six crêtes, dont neuf à douze crêtes dorsales obliques et douze à quinze crêtes ventrales longitudinales (Fig. 3G).

Chez les trois espèces, les crêtes sont orientées de la droite vers la gauche sur les deux faces, selon un axe d'orientation sub-frontal.

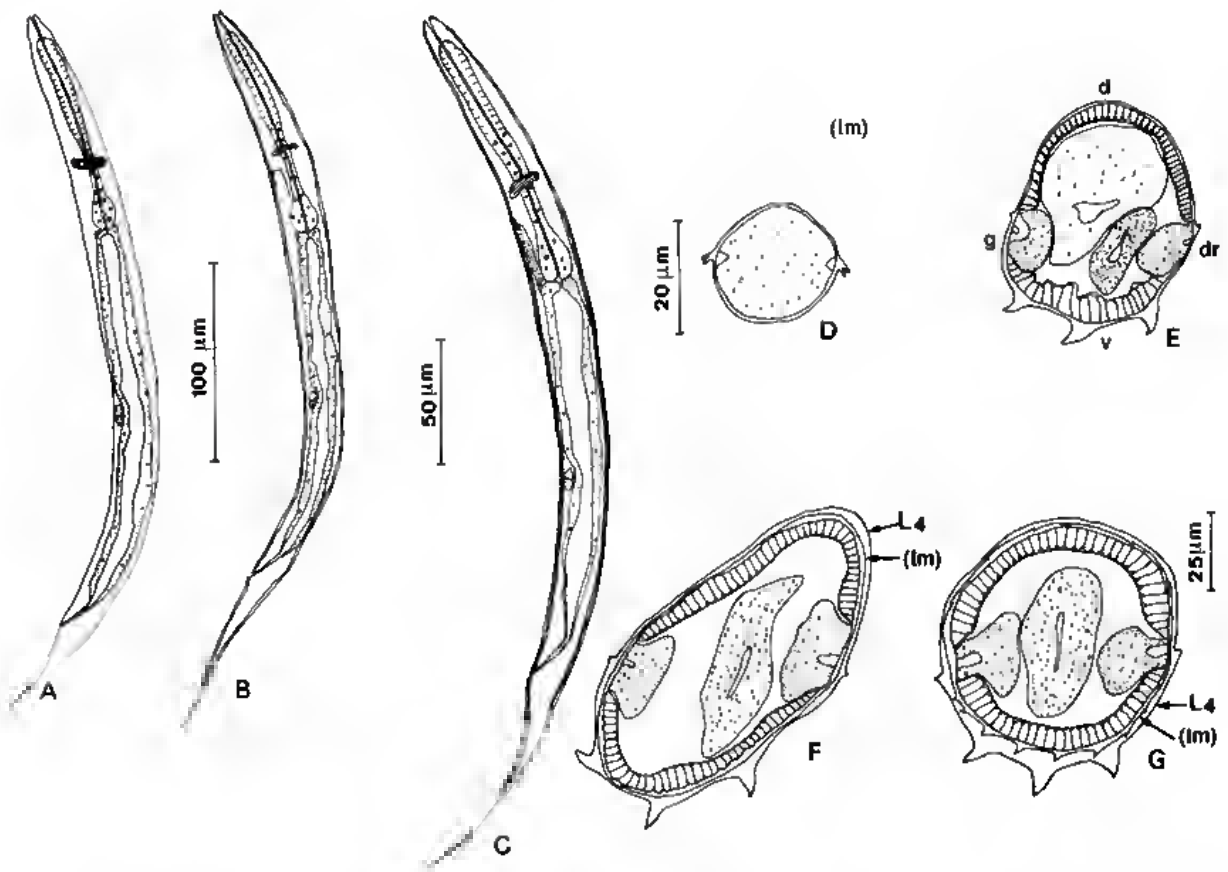


FIG. 3. — *Heligmosomum mixtum* (Schulz, 1954). A-C : stades larvaires libres en vue latérale gauche. A, L_1 à J_1. B, L_2 à J_2. C, L_3 à J_3. D-G : stades larvaires parasites et immatures, coupes transversales au milieu du corps. D, L_3 mâle à J_3. E, L_4 femelle à J_7. F, (Im) mâle à J_9, le synlophe de l'immature n'est pas encore formé. G, (Im) femelle à J_9, les synlophes de la L_4 et de l'immature sont visibles. Toutes les coupes de corps sont orientées comme la figure E. d, dos ; v, ventre ; g, gauche ; dr, droite ; (L_3), Larve 3 enfermée dans la cuticule de la L_2 ; (L_4), Larve 4 enfermée dans la cuticule de la L_3 ; (Im), ver immature enfermé dans la cuticule de la L_4. Échelles : A-B : 100 µm, C : 50 µm, D : 20 µm, E-G : 25 µm.

Source : MNHN, Paris

TABLEAU 3 — Principales mensurations exprimées en µm des stades libres L_1, L_2, (L_3) d'*Heligmosomum mixtum*.

Jours après mise en culture des œufs	J1	J2	J4
Stades larvaires	L1	L2	(L3)
Nombre de larves mesurées	10	10	10
Longueur du corps	356 304 - 405	375 332 - 414	393 360 - 457
Largeur du corps	23 19 - 26	23 21 - 27	23 20 - 27
Hauteur du pharynx	13,5 12 - 15	13,5 12 - 17	13,5 11 - 16
Position anneau nerveux par rapport à la tête	71 50 - 77	73 61 - 81	75 71 - 107
Position pore excréteur par rapport à la tête	-	85 76 - 94	86 75 - 110
Longueur de l'œsophage	105 90 - 119	106 101 - 120	113 102 - 129
Longueur de l'ébauche génitale	8 6-10	8 6 - 11	6 6-10
Dist. ébauche gén. / queue sur longueur du corps	186 167 - 219	194 169 - 234	199 170 - 250
Longueur de la queue	64 56 - 67	80 67 - 83	82 65 - 86

Chez les deux *Heligmosomoides*, les trois crêtes ventrales gauches sont plus développées que les autres crêtes et le nombre de crêtes est généralement légèrement plus élevé sur la face dorsale. Chez *Heligmosomum mixtum*, les crêtes sont de taille équivalente et leur nombre est plus important sur la face ventrale que sur la face dorsale.

Notons par ailleurs que, comme chez les autres Trichostrongles, les glandes excrétrices de la L_4 sont très développées et que les papilles labiales externo-latérales n'apparaissent que chez l'adulte. De plus, ce n'est qu'au stade immature que la queue de la femelle subit une torsion de 45° par rapport à la vulve, soit vers la gauche chez *Heligmosomoides laevis*, soit vers la droite chez *Heligmosomoides polygyrus polygyrus* et chez *Heligmosomum mixtum*.

Mensurations

Les principales mensurations des stades libres, des stades larvaires et des immatures sont données dans les tableaux 1 et 4 pour *Heligmosomoides laevis*, les tableaux 2 et 5 pour *Heligmosomoides polygyrus polygyrus* et les tableaux 3 et 6 pour *Heligmosomum mixtum*.

Source : MNHN, Paris

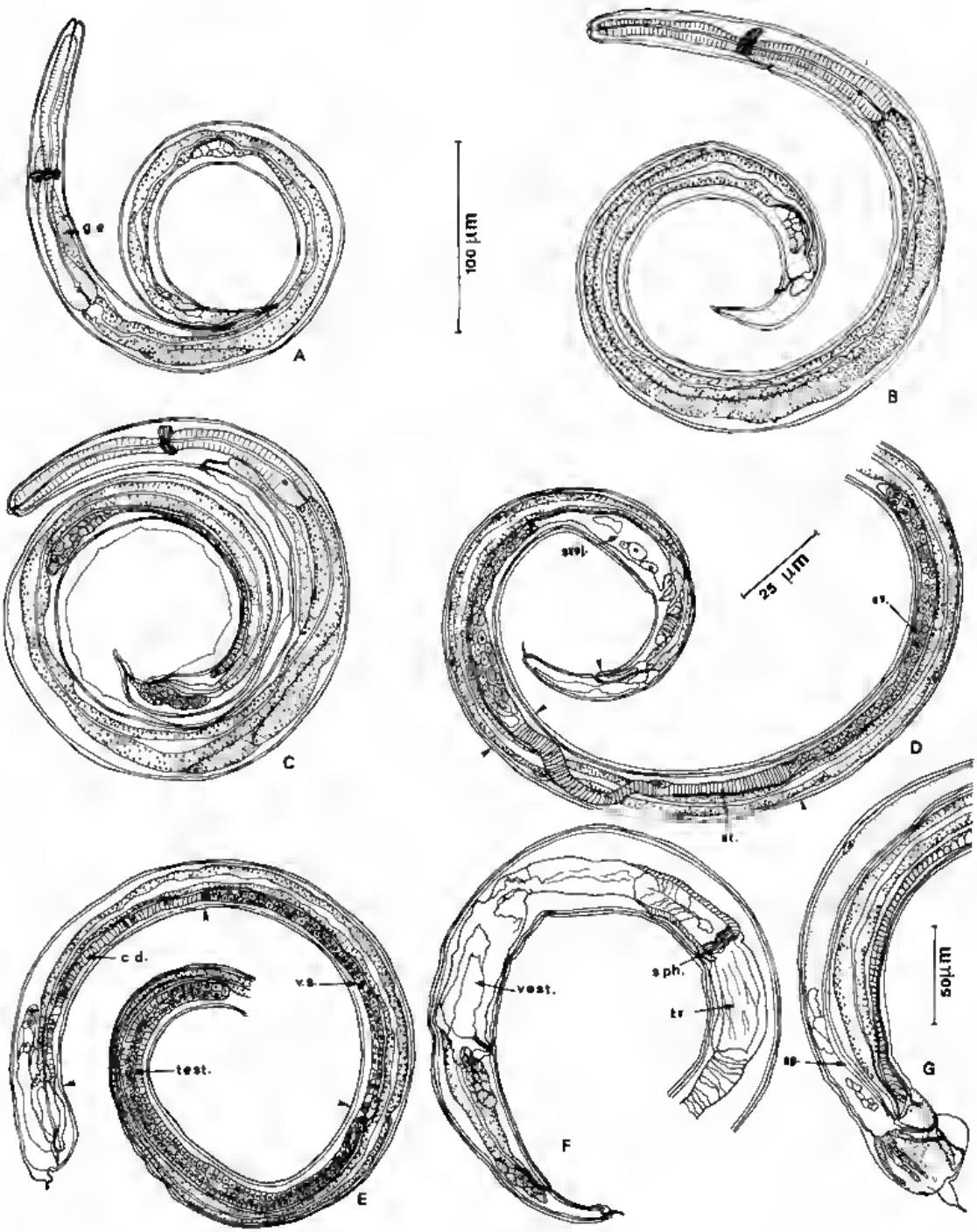


FIG. 4. — *Heligmosomoides laevis* (Dujardin, 1845), stades larvaires parasites et immatures. A, L_3 mâle à J_3, vue latérale droite. B, L_3 femelle à J_3, vue latérale gauche. C, (L_4) mâle à J_4, vue latérale gauche. D-G : parties postérieures D, L_4 femelle à J_5, en vue latérale gauche. E, L_4 mâle à J_5, vue latérale droite. F, (Im) femelle à J_6, vue latérale droite. G, (Im) mâle à J_5, vue latérale droite. (L_4), larve 4 enfermée dans la cuticule de la L_3 ; (Im), ver immature enfermé dans la cuticule de la L_4 g.e., glande excrétrice ; c.d., canal déférent ; test., testicule ; vs., vésicule séminale ; sp., spicule ; vest., vestibule ; sph., sphincter ; tr., trompe. Sur la figure D, les flèches indiquent les différentes parties de l'appareil génital femelle : ovaire (ov.), utérus (ut.), ovéjecteur (ovéj.). Échelles : A-C, E : 100 µm, D : 25 µm, F-G : 50 µm.

Source : MNHN, Paris

TABLEAU 4. — Principales mensurations exprimées en µm des stades larvaires parasites et des vers immatures d'*Heligmosomoides laevis* de H_6 à J_5 après l'infestation de *Microtus arvalis*. M : mâle, F : femelle.

Temps après l'infestation	H6	H12	H18	J1		J3	J3	J4	J5	J5
Localisation	estomac	estomac	intestin	intestin		intestin	intestin	intestin	intestin	intestin
Stades parasites	L3	L3	L3	L3		(L4)	L4	L4	(Im.)	Im.
Nombre de specimens mesurés	6	5	5	5	M	1	3	3	2	2
						1	5	6	5	2
					F	0	2	3	3	0
Longueur du corps	339	412	419	403	M	960	1175	2660	3125	3890
	260 - 395	375 - 440	408 - 432	350 - 440			925 - 1300	2465 - 2815	2850 - 3400	3620 - 4100
					F		2000	3877	4970	
							1530 - 2480	3252 - 4700	4875 - 5090	
Largeur du corps	20,5	20,5	21	22,5	M	40	39	60	75	75
	20 - 26	18 - 22	20 - 22	22 - 24			35 - 42	52 - 70	60 - 65	70 - 80
					F		46	60	93	
							42 - 50	50 - 70	80 - 110	
Position anneau nerveux par rapport à la tête	81	98	91	82,5	M	115	112	224	182	267
	65 - 95	88 - 110	89 - 100	68 - 95			90 - 130	182 - 250	145 -220	250 - 285
					F		151	160	229	
							140 - 163	150 - 180	202 - 270	
Position pore excréteur par rapport à la tête	89	104	104	94	M	112	156	261	240	295
	67 - 105	92 - 116	98 - 110	80 - 108			110 - 206	218 - 300	210 - 270	260 - 330
					F		191	257	278	
							182 - 200	242 - 285	230 - 320	
Longueur de l'œsophage	137	165	154	148	M	222	307	456	440	510
	110 - 154	152 - 182	145 - 160	132 - 160			190 - 366	370 - 520	370 - 510	470 - 550
					F		437	466	540	
							365 - 510	452 - 525	500 - 585	
Longueur de l'ébauche génitale	14	16	16,5	16,5	M	38	414	933	1530	1640
	12 - 18	14 - 19	13 - 20	17 - 22			340 - 555	443 - 1210		1620 - 1660
					F		298	1100	1283	
							197 - 400	742 - 1130	1150 - 1500	
Longueur de la queue	33 5		43	38,5	M	32	37	40	30	
	26 - 42		36 - 48	32 - 44			22 - 45	28 - 50	20 - 40	
					F		74	85	91	
							72 - 76	82 - 88	60 - 135	
Longueur de l'épine caudale	-	-	-	-	M		13	11,5	7,5	
							12 - 14	10 - 15	5 - 10	
					F		13	13,5	40	
							10 - 16	10 - 16		

Source : MNHN, Paris

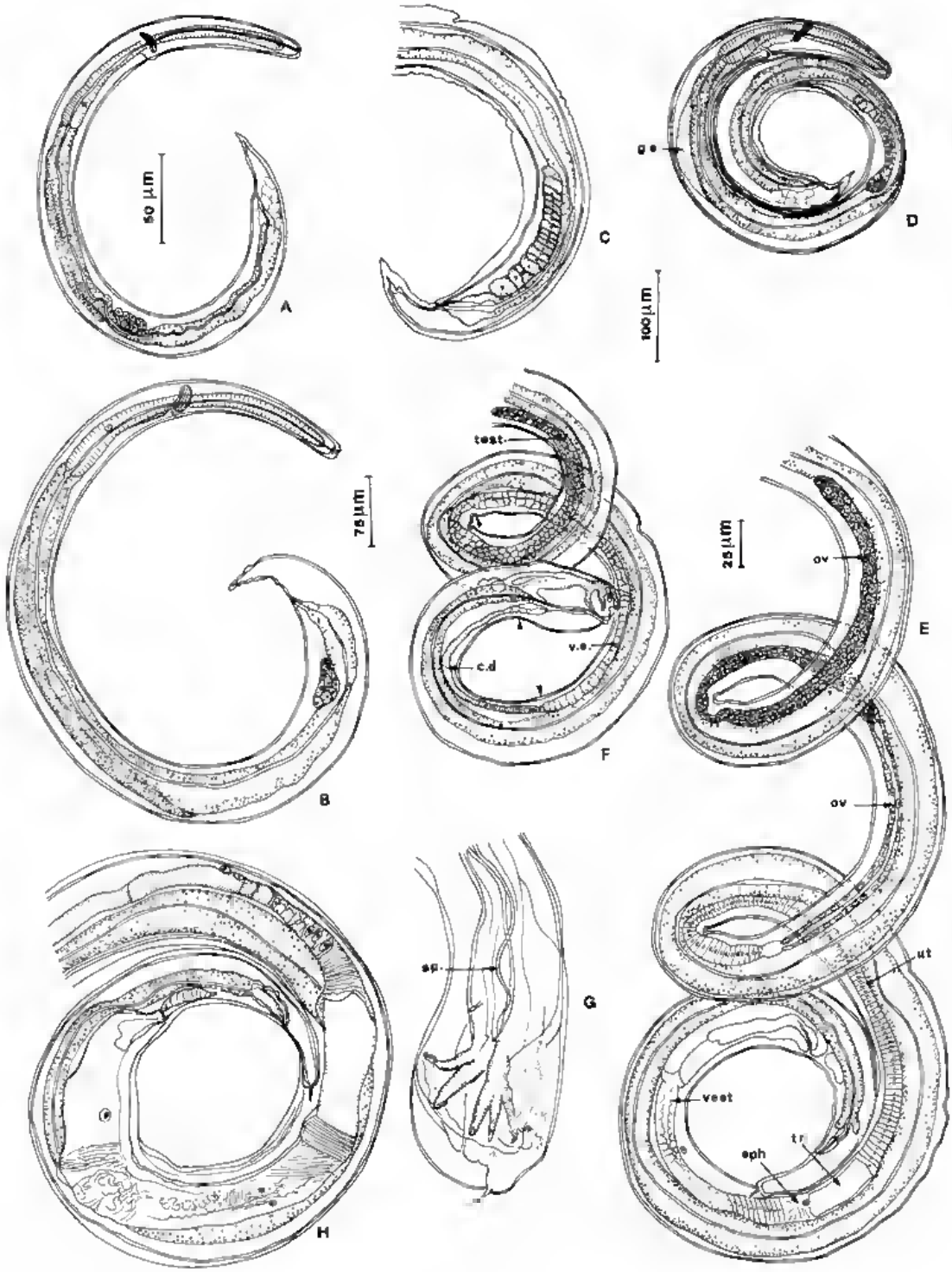


FIG. 5. — *Heligmosomoides polygyrus polygyrus* (Dujardin, 1845), stades larvaires parasites et immatures. A, L_3 mâle à J_3, vue latérale droite. B, L_3 femelle à J_3, vue latérale droite. C, (L_4) femelle à J_4, vue latérale gauche. D, (L_4) mâle à J_4, vue latérale droite. E, L_4 femelle à J_5, vue latérale gauche. F-H : parties postérieures. F, L_4 mâle à J_4, vue latérale gauche. G, (Im) mâle à J_5, vue latérale gauche. H, (Im) femelle à J_5, vue latérale gauche. (L_4), Larve 4 eufermée daus la cuticule de la L_3; (Im), ver immature enfermé dans la cuticule de la L_4; sp., spicule; ov., ovaire; ut., utérus; vest., vestibule; sph., sphincter; tr., trompe; g.e., glande excrétrice. Sur la figure F, les flèches indiquent les différentes parties de l'appareil génital mâle : testicule (test.), vésicule séminale (v.s.), canal déférent (c.d.). Échelles : A, E, G-H : 50 µm, B-C : 100 µm, D, F : 75 µm.

Source : MNHN, Paris

TABLEAU 5. — Principales mensurations exprimées en µm des stades larvaires parasites et des vers immatures d'*Heligmosomoides polygyrus polygyrus* de J_1 à J_7 après l'infestation d'*Apodemus flavicollis*. M : mâle, F : femelle.

Temps après l'infestation	J1	J2	J3		J3	J4	J5	J5	J6	J6	J7
Localisation	estomac	intestin	intestin		intestin	intestin	intestin	intestin	intestin	intestin	intestin
Stades parasites	L3	L3	L3		(L4)	L4	L4	(im)	(im)	Im	Im
Nombre de specimens mesurés	10	41	8	M	3	9	0	11	0	10	0
					8	21	11	11	10	10	6
				F	5	12	11	0	10	0	6
Longueur du corps	430 395 - 490	490 386 - 625	610 400 - 766	M	905 700 - 1065	2756 1725 - 3540		3800 3240 - 4650		5530 5040 - 5950	
				F	995 640 - 1165	3423 1040 - 4645	5825 3275 - 7300		6880 5810 - 7680		10650 9750 - 12250
Largeur du corps	18 15 - 22	23 16 - 32	30 20 - 38	M	37 25 - 45	66 38 - 80		75 70 - 82		77 68 - 90	
				F	44 40 - 48	60 40 - 100	74 40 - 85		83 70 - 90		70 65 - 80
Position anneau nerveux par rapport à la tête	90 72 - 102	90 75 - 112	93 78 - 110	M	112 95 - 128	140 115 - 172		145 105 - 194		194 168 - 220	
				F	106 90 - 138	140 95 - 184	155 110 - 190		175 160 - 200		200 180 - 250
Position pore excréteur par rapport à la tête	105 90 - 114	104 80 - 135	110 94 - 122	M	139 120 - 150	235 158 - 370		234 150 - 365		360 330 - 470	
				F	155 102 - 180	205 120 - 360	287 150 - 330		336 305 - 380		360 330 - 400
Longueur de l'œsophage	157 120 - 176	158 128 - 200	172 110 - 195	M	208 185 - 235	400 245 - 540		375 315 - 455		430 396 - 545	
				F	213 180 - 240	320 178 - 490	400 300 - 475		436 410 - 467		440 405 - 470
Longueur de l'ébauche génitale	14 12 - 28	20,5 12 - 30	27 16 - 37	M	105 33 - 208	1465 640 - 1840		2433 1600 - 3085			
				F	70 50 - 86	673 80 -1253	1973 866 - 3125		3046 2020 - 4000		
Longueur de la queue	44 35 - 53	41 28 - 52	39 35 - 50	M	49 46 - 52	42 24 - 45		45 28 - 60			
				F	44 32 - 50	84 50 - 106	95 75 - 125		95 65 - 110		120 85 - 155
Longueur de l'épine caudale	-	-	-	M		14,5 5 - 15		15 10 - 22			
				F		13 7 - 24	15,5 10 - 22				12,5 10 - 16

Source : MNHN, Paris

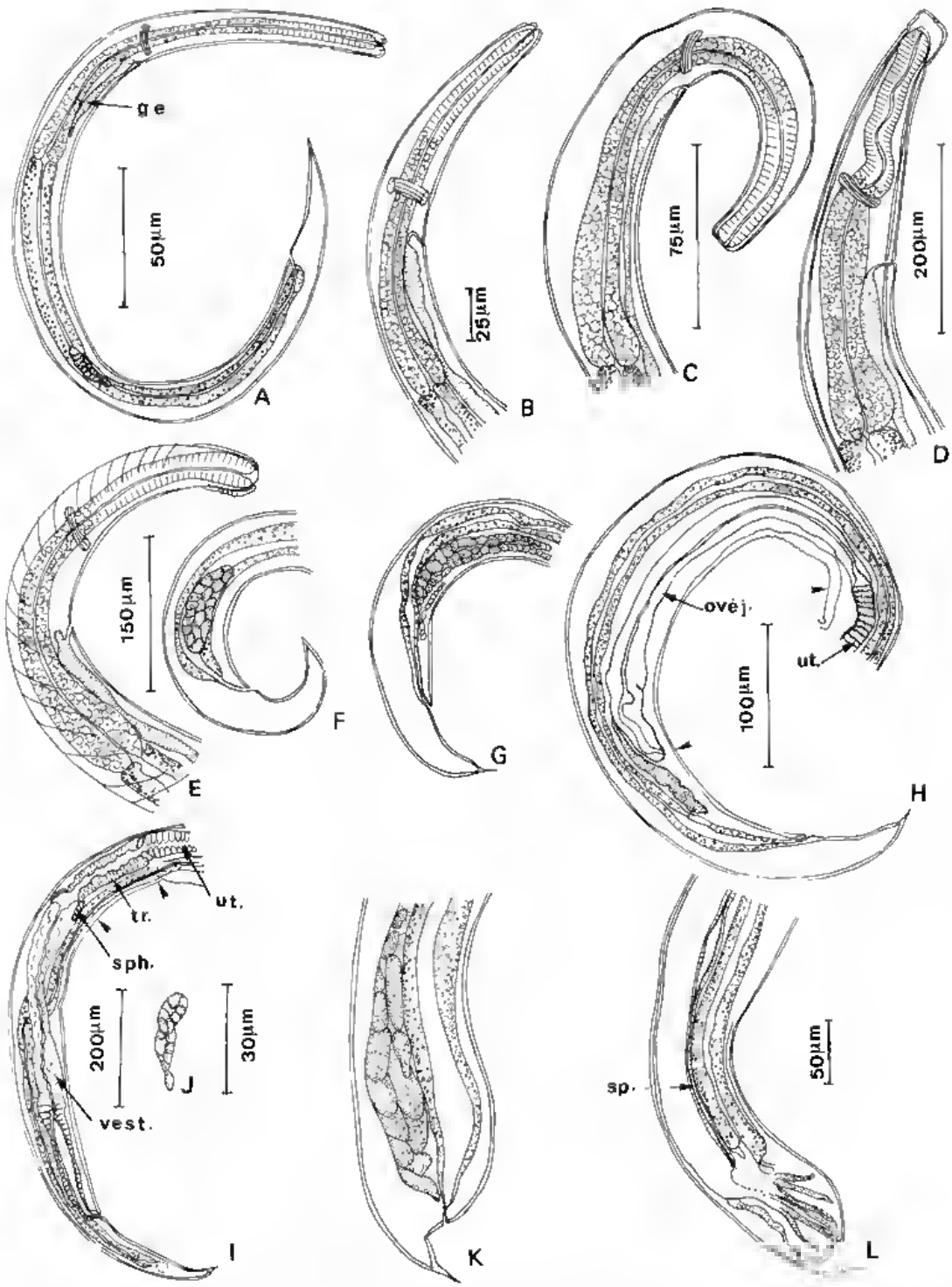


FIG. 6. — *Heligmosomum mixtum* (Schulz, 1954), stades larvaires parasites et immatures. A, L_3 mâle à J_2, vue latérale droite. B-E : extrémités antérieures, vues latérales droites. L_3 femelle à J_3. C, L_4 femelle à J_3. D, (Im,) mâle à J_6. E, Im mâle à J_8. F-I : extrémités postérieures femelles, vues latérales droites. F, L_3 à J_3. G, L_4 à J_3. H, L_4 à J_5. I, Im à J_9. J, L_3 mâle à J_2, ébauche génitale. K-L : mâle, parties postérieures, vues latérales droites. K, L_4 à J_5. L, (Im) à J_6. (L_4), larve 4 enfermée dans la cuticule de la L_3 ; (Im), ver immature enfermé dans la cuticule de la L_4. sp., spicule ; ovéj., ovéjecteur ; ov., ovaire ; ut., utérus ; vest., vestibule ; sph., sphincter ; tr., trompe ; g.e., glande excrétrice. Échelles : A : 50 µm, B : 25 µm, C : 75 µm, D : 200 µm, E : 150 µm, F-H, K : 100 µm, I : 200 µm, J : 30 µm, L : 50 µm.

Source : MNHN, Paris

TABLEAU 6. — Principales mensurations exprimées en µm des stades larvaires parasites et des vers immatures d'*Heligmosomum mixtum* de J_2 à J_{12} après l'infestation de *Clethrionomys glareolus*. M : mâle, F : femelle.

Temps après l'infestation	J2	J3		J3	J4	J5	J6	J7	J10
Localisation	intestin	intestin		intestin	intestin	intestin	intestin	intestin	intestin
Stades parasites	L3	L3		L4	L4	L4	(Im.)	Im.	Im.
Nombre de specimens mesurés	2	2	M	4	3	3	5	9	8
				7	6	6	10	13	15
			F	3	3	3	5	4	7
Longueur du corps	380	684	M	1020	1300	4350	4490	4450	7700
	373 - 387	657 - 711		985 - 1075	1187 - 1475	2800 - 5230	3810 - 5070	3100 - 6580	4100 - 9200
			F	1140	1350	4860	5110	5100	8840
				1100 - 1300	1235 - 1420	3700 - 5650	4700 - 5720	4090 - 5970	7700 - 10300
Position anneau nerveux par rapport à la tête	87	110	M	125	86	148	215	212	245
	86 - 88	100 - 120		98 - 152	67 - 119	127 - 182	178 - 239	170 - 350	205 - 309
			F	140	103	173	167	225	230
				102 - 162	97 -112	150 - 212	160 - 189	160 - 277	175 - 270
Position pore excréteur par rapport à la tête	89,5	134	M	139	105	293	328	320	390
	89 - 90	129 - 139		131 - 158	85 - 122	282 - 310	314 - 352	246 - 398	285 - 440
			F	152	110	315	200	385	395
				140 - 166	97 - 119	295 - 335	163 - 242	285 - 470	370 - 435
Longueur de l'œsophage	142	219	M	229	383	419	522	540	557
	138 - 146	211 - 226		209 - 254	280 - 459	400 - 447	518 - 534	487 - 594	514 - 594
			F	324	281	450	550	602	556
				297 - 345	246 - 320	440 - 470	477 - 590	495 - 677	525 - 595
Longueur de l'ébauche génitale	20	46	M	177	183	1210			
	18 - 22	44 - 47		143 - 212	167 - 205	995 - 1360			
			F	170	195	2100			
				127 - 211	95 - 324	1960 - 2230			
Longueur de le queue	51	55	M						
	50 - 52	52 - 57							
			F	57	63	60	59	65	67
				55 - 59	61 - 66	54 - 66	55 - 69	62 - 71	64 -73

Source : MNHN, Paris

DISCUSSION

La morphogenèse larvaire des genres *Heligmosomoides* et *Heligmosomum* révèle leurs très grandes affinités. Contrairement aux Nippostrongylinae (Heligmosomoidea) déjà connus, la larve 4 ne possède pas de vésicule céphalique et présente, dans les deux sexes, une épine caudale que l'on retrouvera chez la femelle adulte. La torsion de la queue ne se fait qu'au stade immature, de 45°, soit à gauche chez *Heligmosomoides laevis*, soit à droite chez *Heligmosomoides polygyrus polygyrus* et *Heligmosomum mixtum*. Les synlophes larvaires sont très proches, comme l'avait déjà observé ASAKAWA (1990), en décrivant le synlophe de la L_4 d'*Heligmosomum yamagutii* Chabaud *et al.*, 1963. Cependant, ce synlophe n'a pas de crête latérale droite, mais trois crêtes ventrales et une crête latérale gauche. Contrairement à ce que l'auteur a écrit, il n'existe donc pas d'axe d'orientation, puisque toutes les crêtes sont orientées dans la même direction.

Il est remarquable de constater que les synlophes larvaires d'*Heligmosomoides polygyrus polygyrus* et d'*Heligmosomum yamagutii* ne possèdent pas d'axe d'orientation, alors qu'il en existe un chez *Heligmosomoides laevis* et *Heligmosomum mixtum*. Du point de vue de l'ontogenèse larvaire, rien n'implique donc qu'*Heligmosomum* soit plus évolué qu'*Heligmosomoides*.

Ceci nous conforte dans l'idée que, du point de vue systématique, la division du genre *Heligmosomum* en deux sous-genres, proposée par ASAKAWA & SATOH (1987), est inutile. De plus, dans leur article, les auteurs choisissent *Heligmosomum mixtum* Schulz, 1954 comme espèce-type du sous-genre *Paraheligmosomum*. Dans la définition de ce sous-genre, ils s'appuient sur les caractères du synlophe de spécimens récoltés chez *Clethrionomys rutilus mikado* au Japon et qu'ils ont identifiés, par erreur, à *Heligmosomum mixtum* décrit pour la première fois par Schulz (1954) chez *Clethrionomys rutilus* en Russie. En fait, il s'agit d'une autre espèce d'*Heligmosomum*, puisque le synlophe d'*Heligmosomum mixtum* décrit par TRAVASSOS & DARRIBA (1929) (sous le nom d'*Heligmosomum costellatum*) chez *Clethrionomys rutilus* de Russie, puis par DURETTE-DESSET (1968) et par GENOV & JANCEV (1981), chez le même hôte et dans la même région, est caractérisé par des crêtes obliques sur toute la face dorsale et par des crêtes longitudinales sur toute la face ventrale, alors que les spécimens japonais possèdent des crêtes longitudinales uniquement sur la face ventrale gauche. Nous proposons de nommer l'espèce d'Asakawa & Satoh, 1987, *Heligmosomum asakawai* n.sp. [= *Heligmosomum* (*Paraheligmosomum*) *mixtum sensu* Asakawa & Satoh, 1987, *nec* Schulz, 1954]; en effet, la description des auteurs est suffisamment précise pour en déduire que l'identification comme *Heligmosomum mixtum* était erronée. Si le sous-genre était utilisé, il serait logique de considérer *Heligmosomum asakawai* comme l'espèce-type. Nous pensons personnellement qu'il est plus simple de ne pas utiliser ce sous-genre.

Dans la faune de France, *Heligmosomoides polygyrus polygyrus* fait partie du contingent arrivé en Europe occidentale à partir du centre de dispersion d'Europe orientale (voir DURETTE-DESSET 1967), avec quelques autres espèces dont les deux seules communes sont *Heligmosomoides laevis* et *Heligmosomum mixtum*. *Heligmosomoides laevis* est bien la forme la plus primitive avec une bourse caudale symétrique et des crêtes cuticulaires longitudinales. *Heligmosomoides polygyrus polygyrus* est plus évoluée que la précédente, puisque la bourse caudale est fortement asymétrique et que le nombre de crêtes est plus élevé que chez *Heligmosomoides laevis*. Elle reste cependant très proche de cette espèce, ce qui semblerait indiquer que la capture

Source : MNHN, Paris

par les Muridés s'est effectuée précocément à partir d'espèces proches des formes primitives comme *Heligmosomoides laevis*. L'espèce la plus évoluée est *Heligmosomum mixtum*, puisque les crêtes dorsales sont obliques et non longitudinales.

La morphogenèse larvaire ne permet donc pas de confirmer la position phylétique des adultes puisque les synlophes de la L_4 d'*Heligmosomoides laevis* et d'*Heligmosomum mixtum* sont comparables et s'opposent à ceux d'*Heligmosomoides polygyrus polygyrus* et d'*Heligmosomoides yamagutii*. Par contre, elle met en évidence les relations étroites existant entre *Heligmosomoides* (crêtes longitudinales) et *Heligmosomum* (crêtes obliques sur au moins une des quatre faces du corps).

Remerciements

Nous remercions le Dr P. DELATTRE et Mr. J. P. QUERE du Laboratoire d'éco-éthologie de l'Institut national de recherches agronomiques de Montpellier, ainsi que le Dr P. GIRAUDOUX, du Laboratoire d'écologie de l'université de Bourgogne, qui nous ont facilité la capture des rongeurs.

RÉFÉRENCES

ABU-MADI M. A., REID A. P., LEWIS J. W. & HOMINICK W. M., 1994. — Genomic variability within laboratory and wild subspecies of *Heligmosomoides polygyrus*. *J. Helminthol.* **68**: 93-96.

ASAKAWA M., 1987. — Genus *Heligmosomoides* Hall, 1916 (Heligmosomidae: Nematoda) from the Japanese wood mice, *Apodemus* spp. III. The life cycle of *Heligmosomoides kurilensis kobayashi* (Nadtochii, 1966) in ICR mice and preliminary experimental infection to jirds. *J. College Dairying* **12**: 131-140.

— 1990. — *Heligmosomum (Paraheligmosomum) yamagutii* Chabaud *et al.*, 1963 (Heligmosomidae: Nematoda), from red-backed vole, *Clethrionomys rex* (Microtidae; Rodentia) on Mt. Petegari, Japan. *J Rakuno Gakuen Univ.* **15** : 159-165.

ASAKAWA M. & SATOH R., 1987. — Discovery of the genus *Heligmosomum* Raillet et Henry, 1909 (Heligmosomidae; Nematoda) from japanese *Clethrionomys* and establishment of *Paraheligmosomum* n. subgen. *J. College Dairying* **12**: 111-119.

BAYLIS H. A., 1926. — On a trichostrongylid nematode from the wood-mouse (*Apodemus sylvaticus*). *Ann. Mag. Nat Hist* **18**: 455-464.

BROWN, E. D., MACDONALD D. W., TEW T. E. & TODD I. A., 1994. — Rhythmicity of egg production by *Heligmosomoides polygyrus* in wild wood mice, *Apodemus sylvaticus*. *J. Helminthol.* **68**: 105-108.

BRUMPT E., 1922. — *Enseignement de parasitologie appliquée au diagnostic, à l'hygiène et à l'épidémiologie*. Masson, Paris, série 3, 7e leçon **16** : 4-24.

CHABAUD A. G., RAUSCH R. L. & DESSET M.-C., 1963. — Nématodes parasites de Rongeurs et d'Insectivores japonais. *Bull. Soc. Zool. France* **88** : 489-512.

DUJARDIN F., 1845. — *Histoire naturelle des Helminthes ou Vers intestinaux*. Paris, XVI, 645 + 15 p.

DURETTE-DESSET M.-C., 1967. — Évolution des Nématodes Héligmosomes en rapport avec celle de leurs hôtes fondamentaux, les Microtidae. *C. R. Acad. Sci*, Paris **265** : 1500-1503.

— 1968. — Identification des Strongles de Mulots et de Campagnols décrits par Dujardin. *Ann. Parasit. Hum. Comp.* **43** : 387-404.

— 1985. — Trichostrongyloid nematodes and their vertebrate hosts: reconstruction of the phylogeny of a parasitic group. *Adv. Parasitol.* **24**: 239-306.

DURETTE-DESSET M.-C. & CASSONE J., 1987. — Sur deux Nématodes Trichostrongyloïdes parasites d'un Muridé africain. III. – Dualité physiologique des larves infestantes, liée aux rythmes saisonniers. *Ann. Parasit. Hum. Comp.* **62** : 577-589.

Source : MNHN, Paris

DURETTE-DESSET M.-C., KINSELLA J. M. & FORRESTER D. J., 1972. — Arguments en faveur de la double origine des Nématodes néarctiques du genre *Heligmosomoides* Hall, 1916. *Ann. Parasit. Hum. Comp* **62** : 365-382.

DURETTE-DESSET M.-C. & CHABAUD A. G., 1993. — Nomenclature des Strongylida au-dessus du groupe-famille. *Ann. Parasit. Hum. Comp.* **68** : 111-112.

ELTON C., FORD E. B., BAKER J. R. & GARDNER A. D., 1931. — The health and parasites of a wild mouse population. *Proc. Zool. Soc. London* **2**: 657-721.

EHRENFORD F. A., 1954. — The life cycle of *Nematospiroides dubius* Baylis (Nematoda: Heligmosomidae). *J. Parasitol.* **40**: 480-481.

FAHMY M. A. M., 1956. — An investigation on the life cycle of *Nematospiroides dubius* (Nematoda: Heligmosomidae) with special reference to the free-living stages. *Z. Parasitenk.* **17**: 394-399.

FORRESTER D. J., 1971. — *Heligmosomoides polygyrus* (= *Nematospiroides dubius*) from wild rodents of northern California: natural infections, host specificity and strain characteristics. *J. Parasitol.* **57**: 498-503.

GENOV T. & YANCEV Y., 1981. — The morphology and taxonomy of nematodes of the genera *Heligmosomoides* Hall, 1916 and *Heligmosomum* Raillet et Henry, 1909 (Heligmosomidae Cram, 1927) in Bulgaria. *Khelminthologiya* **12**: 8-30.

HASEGAWA H., OTSURU M. & TOBITA K., 1983. — First record of *Heligmosomoides polygyrus* from Japan (Nematoda : Heligmosomidae). *Jap. J. Parasitol.* **32**: 419-423.

HUBERT J. & KERBŒUF D., 1984. — A new method for culture of larvae used in diagnosis of ruminant gastrointestinal strongylosis: comparison with fecal cultures. *Can. J. Comp. Med.* **48**: 63-71.

QUINNELL R. J., BEHNKE J. M. & KEYMER A. E., 1991. — Host specificity of and a cross-immunity between two strains of *Heligmosomoides polygyrus*. *Parasitology* **102**: 419-427.

ROMAN E., 1951. — Étude écologique et morphologique sur les Acanthocéphales et les Nématodes parasites des Rats de la région lyonnaise. *Mém. Mus. natn. Hist. nat.*, Paris, sér. A, Zool. **2** : 249-270.

SCHULZ R. S., 1954. — Dictyocaulides et Heligmosomatides, *In* SKRJABIN K. I., SCHIKHOBALOVA N. P. & SCHULZ R. S., *Osnovy Nematodologii*, Moscou **4**: 1-123.

SPURLOCK G. M., 1943. — Observations on host-parasite relations between laboratory mice and *Nematospiroides dubius* Baylis. *J. Parasitol.* **25**: 303-311.

TRAVASSOS L. & DARRIBA A. R., 1929. — Notas sobre *Heligmosominae*. *Sciencia Medica* **7**: 432-438.

Source : MNHN, Paris

Source : MNHN, Paris

Bulletin du Muséum national d'Histoire naturelle, Paris, 4e série, **18**, 1996
Section A, nos 3-4 : 387-400

Cones taken off Wallis and Futuna Islands, South-West Pacific (Mollusca, Gastropoda, Conidae)

by Robert G. MOOLENBEEK & Dieter RÖCKEL

Abstract. — Deep-water benthos off Wallis and Futuna Islands was sampled by dredging and trawling during the MUSORSTOM 7 expedition in 1992. Twenty eight species of the genus *Conus* were obtained, some of which had been translocated from shallow into deeper water. Four species remain unidentified and eighteen represent new regional records, the total number of *Conus* species recorded from this archipelago now standing at fifty-three. *Conus pacificus* n.sp., from 295-600 m, and *C. neptunus futunaensis* n.ssp., from 370-455 m, are described.

Key-words. — Gastropoda, Conidae, Pacific, Wallis & Futuna Islands, systematics, new records, new species, new subspecies.

Gastéropodes Conidae du bathyal de Wallis et Futuna, Pacifique Sud

Résumé. — Le benthos profond de la zone économique des îles Wallis et Futuna a été échantillonné par dragages et chalutages lors de la campagne MUSORSTOM 7 en 1992. Vingt-huit espèces de *Conus* sont reconnues dans le matériel récolté, dont quelques-unes du domaine littoral. Quatre espèces ne sont pas identifiées avec certitude et dix-huit n'étaient pas connues de la région, ce qui porte à cinquante-trois espèces l'inventaire des Conidae de ce petit archipel. Deux taxons du benthos profond sont décrits comme nouveaux : *Conus pacificus* n.sp., récolté entre 295 et 600 m, et *C. neptunus futunaensis* n.ssp., récolté entre 370 et 455 m.

Mots-clés. — Gastropoda, Conidae, Pacifique, Iles Wallis & Futuna, systématique, nouvelle espèce, nouvelle sous-espèce.

R. G. MOOLENBEEK, *Zoölogisch Museum, University of Amsterdam, P.O. Box 94766, GT Amsterdam, The Netherlands.*
D. RÖCKEL, *Neckaranlage 6, 69412 Eberbach am Neckar, Germany.*

INTRODUCTION

Our knowledge on the composition and distribution of the deep-water benthos in the Indo-Pacific is still fragmentary, since very few regions have been adequately sampled. In the present paper, we record material of the gastropod family Conidae from the slopes of the islands of Futuna, Alofi (together constituting the Hoorn or Horne Islands) and Wallis, and of the seamounts lying within the 200 mile economic zone of these islands. The material was obtained by Philippe Bouchet, Bernard Métivier and Bertrand Richer de Forges on R.V. "*Alis*" during the MUSORSTOM 7 expedition carried out in 1992 by the Muséum national d'Histoire naturelle, Paris, and the Institut Français de Recherche Scientifique pour le Développement en Coopération (ORSTOM). A total of 142 dredgings and trawlings were carried out in the upper bathyal zone, down to 1300 m, but the collection also contains some material from less than 100 m depth. A narrative

Source : MNHN, Paris

of the cruise, together with a review of the tectonic history of the area and a station list were presented by RICHER DE FORGES & MENOU (1993).

ABBREVIATIONS AND TEXT CONVENTIONS

MNHN	Muséum national d'Histoire naturelle, Paris.
ZMA	Zoölogisch Museum Amsterdam;
spm	specimen(s), doubtful if alive or dead collected;
sp	species;
lv	live collected specimen(s);
dd	dead collected specimen(s);
stn	station;
RD	relative diameter (maximum diameter of last whorl relative to aperture height);
RSH	relative spire height (shell length minus aperture height/aperture height).

All material is deposited in the Muséum national d'Histoire naturelle (MNHN, Paris) unless otherwise stated. We refer to RÖCKEL *et al.* (1995a) for references to the original descriptions and other relevant literature concerning the taxa discussed here.

SYSTEMATICS

Family CONIDAE Fleming, 1822
Genus **CONUS** Linnaeus, 1758

Conus acutangulus Lamarck, 1810

MATERIAL EXAMINED. — Waterwitch Bank: stn DW 538, 12°30.8'S – 176°40.3'W, 275-295 m, 1 spm. Futuna Island: stn DW 497, 14°19.6'S – 178°04.8'W, 355-369 m, 1 dd.

REMARKS

The species has a vast Indo-West Pacific distribution and is known so far from depths of 0.5 m to 100 m. It is uncertain whether the present specimens have been translocated to the depths of 295-355 m, or represent a deep-water population of the species. The specimen from Waterwitch Bank is subadult (length 10.4 mm). The specimen from Futuna is adult (length 25.9 mm) and has strong, beaded spiral ribs on the last whorl.

Conus aphrodite Petuch, 1979

MATERIAL EXAMINED. — Futuna Island: stn DW 511, 14°14.0'S – 178°11.5'W, 400-450 m, 1 dd.

REMARKS

Conus aphrodite is a true deep-water species, known from the Ryukyu Islands (Japan), the Philippines, and New Caledonia where empty shells are found in 105-370 m. The single specimen

Source : MNHN, Paris

from Futuna (length 15.1 mm), which may have been translocated to 400-450 m depth, represents the first record from the area.

Conus bullatus Linnaeus, 1758

Conus bullatus — RICHARD 1983: 19.

MATERIAL EXAMINED. — Field Bank: stn DW 588, 12°17.3'S – 174°44.6'W, 490-500 m, 1 dd.

REMARKS

Conus bullatus is known from East Africa to the Marquesas and Hawaii and is most common from shallow sublittoral to about 50 m depth, although in the Philippines there are records down to 240 m. The subadult and dead specimen from Field Bank was probably translocated to 490-500 m.

Conus chiangi (Azuma, 1972)

MATERIAL EXAMINED. — Futuna Island: stn DW 514, 14°13.3'S – 178°10.7'W, 349-355 m, 1 dd.

REMARKS

First record from this area. *Conus chiangi* is a deep-water species found so far in Japan to the Philippines and New Caledonia, in 200-400 m depth.

Conus corallinus Kiener, 1845

MATERIAL EXAMINED. — Field Bank: stn DW 597, 12°31.4'S – 174°18.6'W, 469-475 m, 1 dd.

REMARKS

New record for this area. *Conus corallinus* was known from Okinawa (Japan) to Papua New Guinea and New Caledonia, mainly in subtidal depths but also in deep-water down to 240 m.

Conus crocatus Lamarck, 1810

MATERIAL EXAMINED. Field Bank: stn DW 596, 12°31.8'S – 174°18.9'W, 32 m, 1 spm.

REMARKS

This is an Indo-West Pacific species living in depths of 1-80 m. In the Pacific, recorded from Japan to the Marshall Islands, Samoa, Papua New Guinea and the Solomon Islands. The single shell from Field Bank is subadult and probably dead collected.

Source : MNHN, Paris

Conus cylindraceus Broderip & Sowerby I, 1830

MATERIAL EXAMINED. — Bayonnaise Bank: stn CP 629, 11°53.7'S – 179°32.3'W, 400-420 m, 1 fragment.

REMARKS

Conus cylindraceus is known from the Indian Ocean to Polynesia in depths down to about 25 m, indicating that the fragment from Bayonnaise Bank must have been translocated downslope.

Conus dusaveli (H. Adams, 1872)

MATERIAL EXAMINED. — Field Bank: stn DW 597, 12°31.4'S – 174°18.6'W, 469-475 m, 1 dd.
Wallis Island: stn DW 529, 12°31.4'S – 176°39.6'W, 500 m, 2 dd.

REMARKS

First record for the area. *Conus dusaveli* was earlier known from Ryukyu Islands (Japan) to the Philippines, and New Caledonia in depths of 50-290 m. One of the specimens from Wallis Island is a juvenile (length 15.9 mm) that probably represents this species.

Conus eburneus Hwass *in* Bruguière, 1792

Conus eburneus — RICHARD 1983: 19.

MATERIAL EXAMINED. — Wallis Island: stn Lagon sud, 13°22.3'S – 176°11.2'W, 52-55 m, 1 spm.

REMARKS

A species common in the Indo-Pacific from East Africa to Polynesia, intertidal to about 70 m, usually in depths of 1-15 m.

Conus eugrammatus Bartsch & Rehder, 1943

MATERIAL EXAMINED. — Tuscarora Bank: stn DW 556, 11°48.7'S – 178°18.0'W, 440 m, 1 dd.

REMARKS

The single specimen from Tuscarora Bank is in bad condition and its identity is somewhat equivocal. The presence in this region of *Conus eugrammatus*, currently known from Japan to the Philippines, Queensland and Hawaii, would not be unexpected.

Conus floccatus Sowerby II, 1841

Conus floccatus — RICHARD 1983: 19.

Source : MNHN, Paris

MATERIAL EXAMINED. — Bayonnaise Bank: stn CP 629, 11°53.7'S – 179°32.3'W, 400-420 m, 1 dd.

REMARKS

Conus floccatus is a species with a Western Pacific distribution living in depths of less than 100 m. The specimen from Bayonnaise Bank has probably been translocated.

Conus generalis Linnaeus, 1767

MATERIAL EXAMINED. — Bayonnaise Bank: stn DW 625, 11°52.4'S – 179°33.8'W, 425-430 m, 1 juv spm.

REMARKS

An Indo-West Pacific species usually living in depths of 1-50 m, in the Philippines recorded down to 240 m.

Conus imperialis Linnaeus, 1758

Conus imperialis — RICHARD 1983: 19.

MATERIAL EXAMINED. — Wallis Island: stn DW 529, 12°31.4'S – 176°39.6'W, 500 m, 2 dd.
Field Bank: stn DW 596, 12°31.8'S – 174°18.9'W, 32 m, 1 dd.

REMARKS

An Indo-West Pacific species, living intertidally to about 75 m. The specimens found at 500 m depth must have been translocated.

Conus kanakinus Richard, 1983
(Fig. 10)

Conus kanakinus — RÖCKEL *et al.* 1995b: 575-576.

MATERIAL EXAMINED. — Wallis Island: stn DW 522, 13°10.7'S – 176°15.0'W, 650-765 m, 2 dd; stn DW 526, 13°13.4'S – 176°15.5'W, 355-360 m, 1 spm.
Waterwitch Bank: stn DW 538, 12°30.8'S – 176°40.3'W, 275-295 m, 1 spm.

REMARKS

We provisionally identify the four specimens from Wallis Island and Waterwitch Bank as *Conus kanakinus*, so far known only from the New Caledonia region, although doubts remain. The present specimens differ from the New Caledonian ones in having a less elongate last whorl and a colour pattern of dashes and lines instead of only spiral lines. On the other hand, the general facies are similar and the broad, paucispiral protoconch and the spire sculpture are iden-

Source : MNHN, Paris

lical. Two of the specimens are juveniles. The larger ones are 13.7 and 14.2 mm long, and may be adult.

Conus kimioi (Habe, 1965)

MATERIAL EXAMINED. — Field Bank: stn DW 589, 12°16.2'S – 174°41.4'W, 400 m, 1 dd.
Futuna Island: stn DW 499, 14°19.6'S – 178°04.6'W, 290-395 m, 1 dd; stn DW 514, 14°13.3'S – 178°10.7'W, 349-355 m, 1 dd.

REMARKS

A new regional record of this deep-water species, earlier known from Japan to the Philippines and New Caledonia, in 120-250 m.

Conus memiae (Habe & Kosuge, 1970)

MATERIAL EXAMINED. — Futuna Island: stn DW 499, 14°19.6'S – 178°04.6'W, 290-395 m, 1 dd; stn DW 509, 14°14.8'S – 178°11.5'W, 200-240 m, 1 dd.
Wallis Island: stn DW 526, 13°13.4'S – 176°15.5'W, 355-360 m, 1 dd.

REMARKS

A new record for this species, earlier known from Japan to the Philippines and Indonesia, the Solomon Islands and Fiji, generally in depths of 50-250 m.

Conus neptunus futunaensis n.ssp.
(Figs 1-3)

TYPE MATERIAL. — Holotype and 4 paratypes MNHN, 1 paratype ZMA 3.95.014, 1 paratype collection Röckel.

TYPE LOCALITY. — Futuna Island, R.V. *Alis*, MUSORSTOM 7, stn DW 497, 14°19.6'S – 178°04.8'W, 355-369 m, 10 May 1992, P. Bouchet, B. Métivier & B. Richer de Forges coll.

MATERIAL EXAMINED. Futuna Island: stn DW 497, 14°19.6'S – 178°04.8'W, 355-369 m (2 lv, holotype and paratype MNHN 44.7 × 19.0 mm); stn DW 499, 14°19.6'S – 178°04.6'W, 290-395 m (2 dd, paratypes MNHN 44.9 × 21 mm, 31.1 × 12.8 mm); stn DW 504, 14°19.6'S – 178°04.5'W, 300-390 m (3 dd, paratype ZMA 50.8 × 21.2 mm, coll Röckel 46.3 × 20.4 mm, MNHN 47.8 × 20.3 mm).
Wallis Island: stn DW 523, 13°12.0'S – 176°15.6'W, 455-515 m, 1 dd.

ETYMOLOGY. — Named after its type locality.

DESCRIPTION (holotype)

Shell medium-sized and moderately solid. Last whorl ovate (RD 0.52), outline convex, slightly constricted at the base. Shoulder angulate. Spire of moderate height (RSH 0.17), outline deeply concave. Protoconch broken, with probably more than two whorls, maximum diameter 0.8 mm. Teleoconch with 10.5 whorls, slightly stepped. Sutural ramp concave, with 2 strong and

Source : MNHN, Paris

l weak spiral grooves, crossed by close-set axial ribs. First 8 whorls tuberculate. Upper part of last whorl smooth, basal part with 8-10 strong spiral ribs.

Ground colour cream with irregularly scattered dark brown, curved or angular axial dashes and triangular spots, concentrated and underlain light brown or light violet flecks on both sides of centre. Protoconch and base white. Aperture light violet.

Dimensions: shell length 45.5 mm, maximum diameter 19.5 mm, aperture height 37.6 mm.

REMARKS

Dimensions of paratypes range from 44.7 to 50.8 mm, RD 0.51-0.53, RSH 0.14-0.19, relative weight 0.11-0.22 g/mm. Number of protoconch whorls about 3, maximum diameter 0.75-0.8 mm. Number of teleoconch whorls 10.5-11.5, sutural ramps with 3-5 spiral grooves. Colour pattern generally sparser, light brown and paler than in the holotype. A light brown band may be present just below shoulder.

Conus neptunus futunaensis n.ssp. differs from *C. neptunus neptunus* Reeve, 1843 mainly in its ovate shape and smaller size. The last whorl of the nominal subspecies is elongately conical with almost straight sides, while the new subspecies has an ovate shape with convex sides. *C. neptunus neptunus*, known so far only from the Philippines and the South China Sea, attains a length of 80 mm, whereas the largest Futuna specimen is 50.8 mm long.

Conus neptunus futunaensis also resembles *C. laterculatus* Sowerby III, 1870, *C. australis* Holten, 1802, and *C. lienardi* Bernardi & Crosse, 1861. *Conus laterculatus* differs in its narrower and more cylindrical last whorl (RD 0.42-0.51), which is strongly sculptured with grooves and ribbons from base to shoulder. The spire of *Conus laterculatus* is generally lower (RHS 0.10-0.16), the colour pattern consists of more regularly arranged spots and dots instead of scattered lines and triangles. *Conus australis* can be distinguished by its larger size (shell length 60-105 mm), its generally narrower last whorl (RD 0.44-0.52) and its heavily sculptured last whorl. Finally, *Conus lienardi*, from New Caledonia, is similar in size and shape, occasionally also in its pattern, but differs in its less pronounced tubercles on the spire and the spiral grooves on the teleoconch sutural ramp. It also has a more rounded shoulder and an almost smooth last whorl with a white ground colour. The protoconch of *C. neptunus futunaensis* has three or more whorls whereas *C. lienardi* has only 2 to 2.5 whorls.

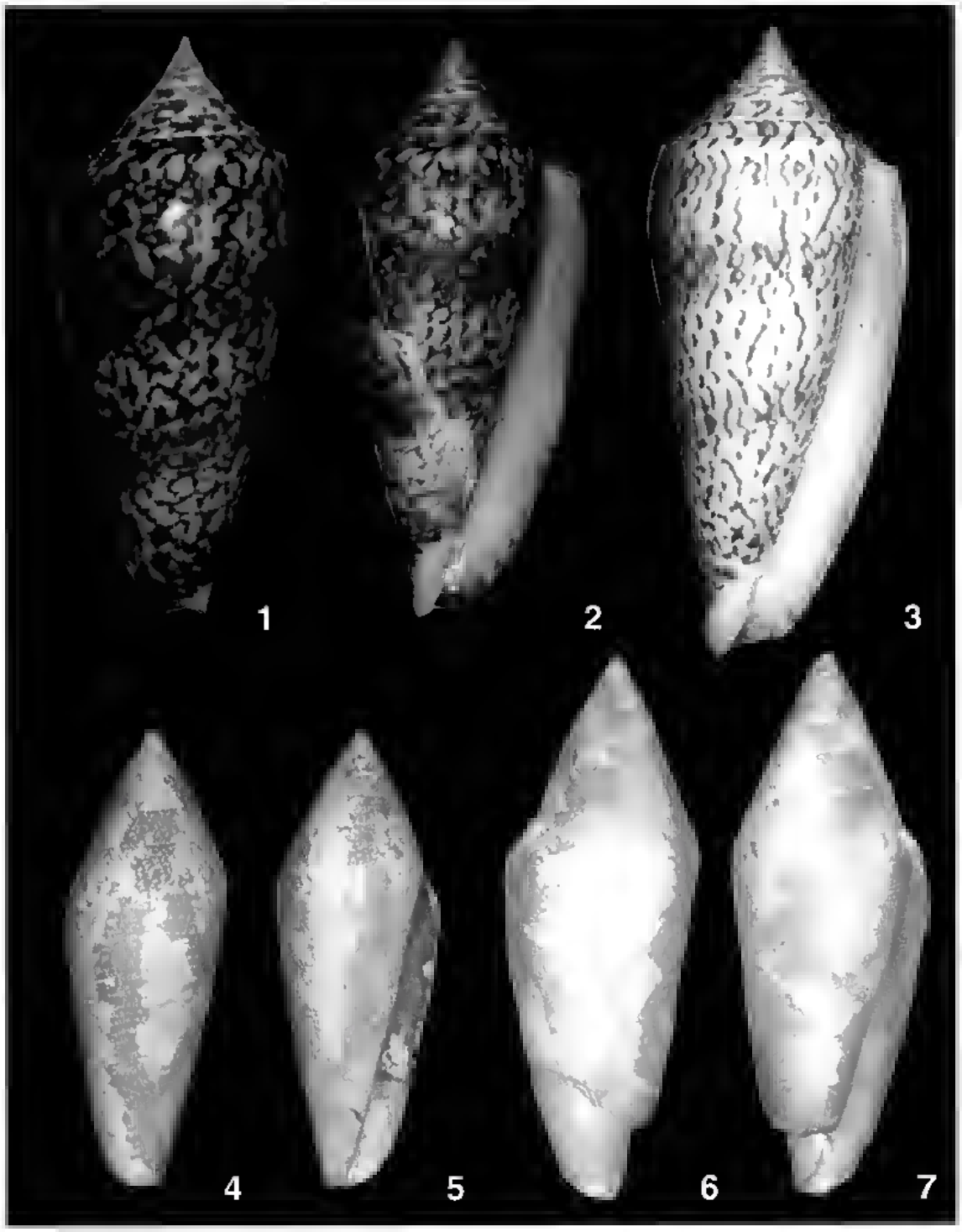
Conus orbignyi Audouin, 1831

MATERIAL EXAMINED. — Futuna Island: stn DW 499, 14°19.6'S – 178°04.6'W, 290-395 m, 1 dd; stn DW 500, 14°19.5'S – 178°04.1'W, 350-394 m, 2 dd; stn DW 511, 14°14.0'S – 178°11.5'W, 400-450 m, 1 dd; stn DW 516, 14°13.5'S – 178°11.6'W, 441-550 m, 1 dd.

REMARKS

Conus orbignyi is a deep-water species known from depths of 50-400 m. The Futuna Island population belongs to the nominal subspecies, whereas *Conus orbignyi coriolisi* Moolenbeek & Richard, 1995 occurs off New Caledonia and in the Coral Sea. This is a new record for the area.

Source : MNHN, Paris



FIGS 1-7. — New taxa of *Conus* from Wallis and Futuna Islands. 1-3, *Conus neptunus futunaensis* n.ssp., Futuna Island; 1-2, holotype, length 45.5 mm, dorsal and ventral views; 3, paratype ZMA, length 50.8 mm, ventral view. 4-7, *Conus pacificus* n.sp., Bayonnaise Bank; 4-5, holotype, length 20.2 mm, dorsal and ventral views; 6-7, paratype ZMA, Waterwitch Bank, length 23.8 mm, dorsal and ventral views.

Source : MNHN, Paris

Conus pacificus n.sp.
(Figs 4-7)

TYPE MATERIAL. — Holotype and 1 paratype MNHN, 1 paratype ZMA 3.95.013.

TYPE LOCALITY. — Bayonnaise Bank, R.V. *"Alis"*, MUSORSTOM 7, stn DW 626, 11°53.6'S – 179°32.0'W, 597-600 m, 29 May 1992, P. Bouchet, B. Métivier & B. Richer de Forges coll.

MATERIAL EXAMINED. — Waterwitch Bank: stn DW 538, 12°30.8'S – 176°40.3'W, 275-295 m (1 dd, paratype ZMA, 23.8 mm × 8.7 mm, aperture height 16.5 mm, RD 0.53, RSH 0.31).

Field Bank: stn DW 588, 12°17.3'S – 174°44.6'W, 490-500 m (1 dd, paratype MNHN, 14.4 × 5.1 mm, aperture height 10.5 mm, RD 0.49, RSH 0.27).

ETYMOLOGY. — Named after the Pacific Ocean, where in the deep-sea many unknown animals still await to be discovered.

DESCRIPTION (holotype)

Shell small, cylindrical, fusiform, smooth, and glossy. Relative diameter (RD) of last whorl 0.49, relative spire height (RSH) 0.27. Protoconch partly broken, maximum diameter 0.8 mm. Teleoconch with 7.25 whorls, the first three to four whorls with small nodules and two spiral grooves. On the last whorl only one spiral groove. Shoulder slightly angulate, spire a little convex, sutural ramp almost flat. A few indistinct basal grooves.

Ground colour white, with light brown axial streaks and very fine spiral lines consisting of very fine white spots. On the last whorl four continuous axial brown streaks from base to suture.

Dimensions: shell length 20.2 mm, diameter 7.3 mm, aperture height 14.7 mm.

REMARKS

The paratypes agree in shape and colour with the holotype, one paratype (Figs 6-7) has repaired the severely broken base. None has a well preserved protoconch.

Superficially *Conus pacificus* n.sp. appears to be most similar to the sympatric species *Conus cylindraceus* Broderip & Sowerby I, 1830, especially in its shape. It differs by the colour which is a redder brown in *C. cylindraceus*, and the presence of spiral white spotted lines. The protoconch of *Conus cylindraceus* is narrower (diameter 0.7 mm), its spire outline is sigmoid (upper part concave, following part convex) instead of convex, and the tuberculation of the spire whorls is less pronounced. *Conus auratinus* Da Motta, 1982, although attaining a larger size and having a lower spire, is also similar in shape and pattern and might be a closely related species. Juveniles of *Conus episcopatus* Da Motta, 1882 may have a similar colour pattern but always have a more flat-sided spire.

Conus saecularis Melvill, 1898

MATERIAL EXAMINED. — Bayonnaise Bank: stn CP 629, 11°53.7'S – 179°32.3'W, 400-420 m, 1 dd; stn DW 625, 11°52.4'S – 179°33.8'W, 425-430 m, 1 dd.

Source : MNHN, Paris

REMARKS

Conus saecularis is a deep-water species, living in depths of 85-400 m in the northwestern Indian Ocean and the western Pacific from the Ryukyu Islands (Japan) to the Solomon Islands and Papua New Guinea. This is the first record from the region.

Conus samiae Da Motta, 1982

MATERIAL EXAMINED. — Futuna Island: stn DW 499, 14°19.6'S – 178°04.6'W, 290-395 m, 1 dd.

REMARKS

The validity of *Conus samiae* is questionable. In the Philippines, it is found in deep water, where it may intergrade with *C. sulcatus* Hwass, 1792, variety *bocki* Sowerby III, 1881. Therefore *C. samiae* may be a form of *C. sulcatus*. The single specimen from Futuna Island is a strongly sculptured juvenile (length 26.5 mm) and is only tentatively identified as *Conus samiae*. This is the first record from the region of this species otherwise known from the Philippines and the Solomon Islands.

Conus sponsalis Hwass *in* Bruguière, 1792

Conus sponsalis — RICHARD 1983: 19.

MATERIAL EXAMINED. — Combe Bank: stn DW 543, 12°25.6'S – 177°28.2'W, 27-30 m, 1 spm.

REMARKS

Conus sponsalis is a wide-spread Indo-Pacific shallow-water species.

Conus sulcocastaneus Kosuge, 1981

MATERIAL EXAMINED. — Field Bank: stn DW 594, 12°31.0'S – 174°19.9'W, 495-505 m, 1 dd.

REMARKS

Conus sulcocastaneus is a deep-water species, found in depths of 120-240 m in the Philippines and the Marshall Islands. This is the first record from the area.

Conus tessulatus Born, 1778

Conus tessulatus — RICHARD 1983: 19.

MATERIAL EXAMINED. — Combe Bank: stn DW 542, 12°26.4'S – 177°28.2'W, 370 m, 1 dd.
Field Bank: stn DW 596, 12°31.8'S – 174°18.9'W, 32 m, 1 lv.
Waterwitch Bank: stn DW 538, 12°30.8'S – 176°40.3'W, 275-295 m, 2 dd.

Source : MNHN, Paris

REMARKS

An Indo-Pacific species, living intertidally and subtidally to depths of 40 m. The empty shells from Combe and Waterwitch Banks have most probably been translocated.

Conus sp. 1
(Figs 8-9)

MATERIAL EXAMINED. — Futuna Island: stn DW 499, 14°19.6'S – 178°04.6'W, 290-395 m, 1 dd; stn DW 512, 14°13.5'S – 178°10.3'W, 210-245 m, 1 dd.

REMARKS

The identity of these two shells from Futuna Island is unclear. They superficially resemble *Conus praecellens* A. Adams, 1854, but differ in their less pyriform last whorl and particularly in protoconch characters. While typical *Conus praecellens* has a paucispiral protoconch with about 2 whorls, the protoconch of the smaller shell (length 22.3 mm) from Futuna Island is multispiral with three or more whorls. The protoconch of the larger specimen (length 35.9 mm) is broken. These two specimens apparently represent a distinct species.

Conus sp. 2
(Fig. 11)

MATERIAL EXAMINED. — Wallis Island: stn DW 522, 13°10.7'S – 176°15.0'W, 650-765 m, 1 dd.

REMARKS

The single specimen is in very bad condition and measures 24.4 mm in length (RD 0.50, RSH is 0.25). It may prove to be a juvenile of an already described species.

Conus sp. 3
(Fig. 12)

MATERIAL EXAMINED. — Futuna Island: stn DW 514, 14°13.3'S – 178°10.7'W, 349-355 m, 1 dd.

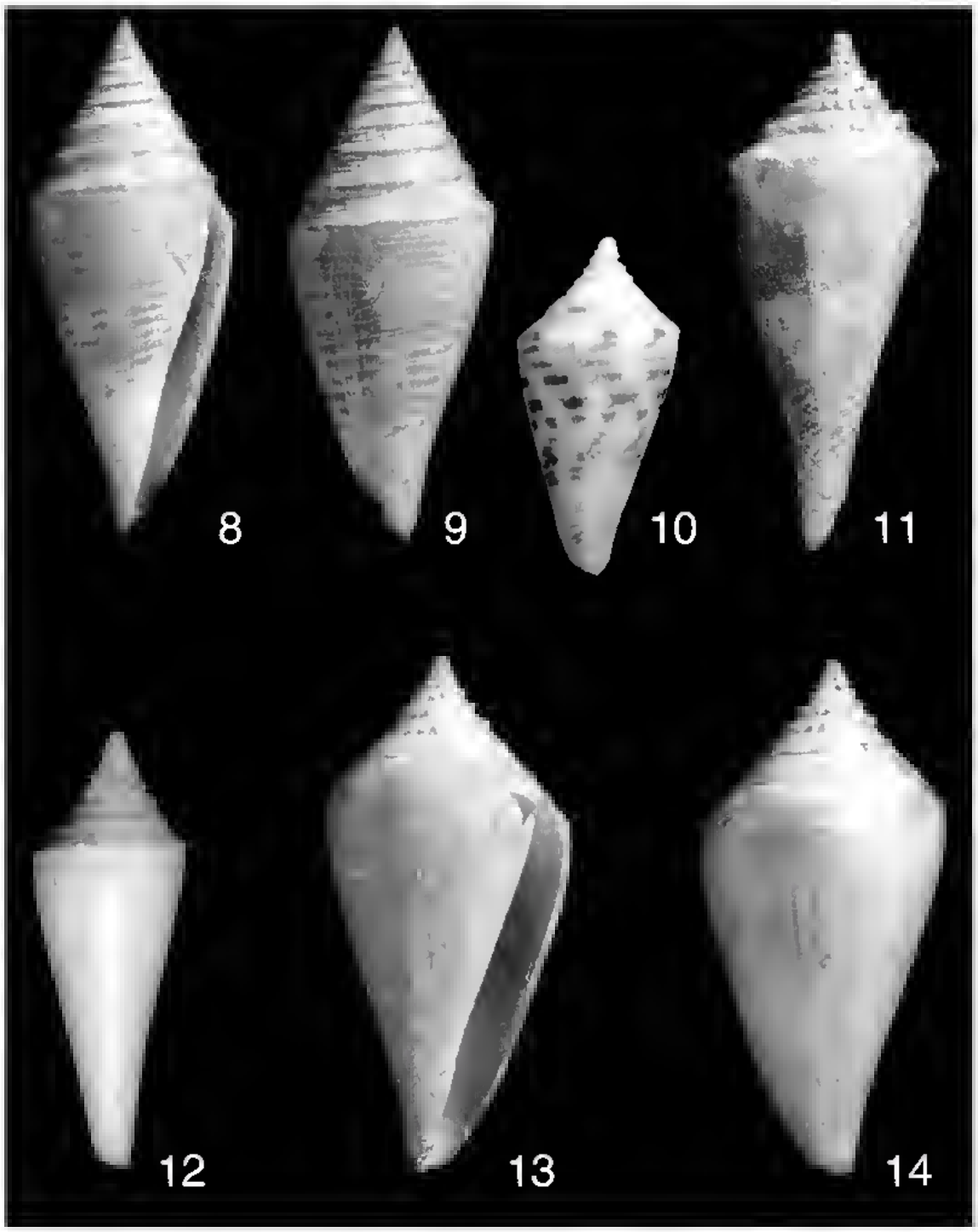
REMARKS

The 16.4 mm high specimen, which may be a juvenile, cannot at present be identified with any known species.

Conus sp. 4
(Figs 13-14)

MATERIAL EXAMINED. — Combe Bank: stn DW 539, 12°27.3'S – 177°27.3'W, 700 m, 2 dd; stn CP 552, 12°15.7'S – 177°27.8'W, 786-800 m, 1 dd.

Source : MNHN, Paris



FIGS 8-14. — Deep-water species of *Conus* from Wallis and Futuna Islands. 8-9, *Conus* sp. 1, Futuna Island, MUSORSTOM 7, stn DW 499, length 35.8 mm, ventral and dorsal views. 10, *Conus kanakinus*, Wallis Island, MUSORSTOM 7, stn DW 522, length 14.2 mm, dorsal view. 11, *Conus* sp. 2, Wallis Island, MUSORSTOM 7, stn DW 522, length 24.4 mm. 12, *Conus* sp. 3, Futuna Island, MUSORSTOM 7, stn DW 514, length 16.4 mm, dorsal view. 13-14, *Conus* sp. 4, Combe Bank, MUSORSTOM 7, stn DW 539, length 23.6 mm, ventral and dorsal views.

Source : MNHN, Paris

REMARKS

The three specimens belong to the *Conus profundorum* complex, which includes *Conus vaubani* Röckel & Moolenbeek, 1995 from the New Caledonia area. They differ from the latter species in having a brown protoconch and indistinct spiral striae on the spire. They may represent a local form of *Conus vaubani* or possibly an undescribed species.

DISCUSSION

Of the twenty-eight species of *Conus* collected during the MUSORSTOM 7 expedition, thirteen are truly deep-water species, with a main distribution below 100 m, and eleven are shallow-water species represented by translocated shells. In addition, four species, which are not identifiable with certainty, may belong to the deep-water fauna. This cone fauna appears to be considerably less diverse than elsewhere in the tropical western Pacific at similar depths, though it is by no means depauperate. Thirty-nine species are recorded from the New Caledonia region from depths greater than 100 m (RÖCKEL *et al.* 1995b), but this is the result of a much more intensive sampling effort. The cone fauna of the nearby Fiji Islands is known mainly through the work of CERNOHORSKY (1964), but the deep-water species have not been sampled.

RICHARD *et al.* (1981, 1982) and RICHARD (1983) have already recorded thirty-seven shallow-water species of *Conus* (actually thirty-five as we regard two of them as synonyms) from Wallis and Futuna. There had been no earlier records of deep-water Conidae from there. All thirteen deep-water species, as well as five shallow-water species collected during the expedition, are new records for the archipelago, thus bringing the total inventory to fifty-three species of *Conus*.

Acknowledgements

The material and information on the MUSORSTOM 7 cruise on which this paper is based was generously placed at our disposal by Dr P. BOUCHET and Ms V. HEROS (both MNHN). We are greatly indebted to Dr P. BOUCHET and Mr B. MARSHALL (New Zealand) for critically reading the manuscript and for their comments. Mr M. FILMER (Chobham, U.K.) gave valuable suggestions concerning the English text.

REFERENCES

CERNORHORSKY W. O., 1964. — The Conidae of Fiji (Mollusca: Gastropoda). *Veliger* **7**: 61-94.

RICHARD G., 1983. — Wallis et Futuna. Ses îles, ses lagons, ses coquillages. *Xenophora* **18**: 9-20.

RICHARD G., GALZIN R., SALVAT B., BAGNIS R., BENNETT J., DENIZOT M. & RICARD M., 1981. — Geomorphology, ecology and socio-economy of the Futuna marine ecosystem (Horn archipelago-Polynesia). *Proc. 4th Int. Coral Reef Symp., Manila* **1**: 269-274.

RICHARD G., BAGNIS R., BENNETT J., DENIZOT M., GALZIN R., RICARD M. & SALVAT B., 1982. — Wallis et Futuna. Etude de l'environnement lagunaire et récifal des îles Wallis et Futuna (Polynésie occidentale). Rapport définitif. *Rapport Ecole Pratique des Hautes Etudes* **RL9**: 1-101.

Source : MNHN, Paris

RICHER DE FORGES B. & MENOU J.-L., 1993. — La campagne MUSORSTOM 7 dans la zone économique des îles Wallis et Futuna. Compte rendu et liste des stations. *In* A. CROSNIER (ed.). Résultats des campagnes MUSORSTOM, volume 10. *Mém. Mus. natl Hist. nat.*, Paris **156**: 9-25.

RÖCKEL D., KORN W. & KOHN A. J., 1995a. — *Manual of the living Conidae. Volume 1: Indo-Pacific region.* Christa Hemmen, Wiesbaden, 517 p.

ROCKEL D., RICHARD G. & MOOLENBEEK R. G., 1995b. — Deep-water Cones (Gastropoda: Conidae) from the New Caledonian region. *In* P. BOUCHET (ed.). Résultats des campagnes MUSORSTOM, volume 14. *Mém. Mus. natl Hist. nat.*, Paris **167** : 557-594.

Source : MNHN, Paris

Bulletin du Muséum national d'Histoire naturelle, Paris, 4e série, 18, 1996
Section A, nos 3-4 ; 401-408

Guamampa n.g. (Gastropoda, Pulmonata), a bradybaenid land snail with monadeniid characters

by Anatoly A. SCHILEYKO

Abstract. — *Guamampa* n.g. is a genus of Aegistinae (Bradybaenidae) characterized by the presence of a single mucus gland entering the stylophore; the distal portion of vas deferens much enlarged; a flagellum of peculiar appearance; the penial verge grooved; and the vagina enlarged and coated with dense white cover. The type species is *Helix tuba* Albers, 1854 from Sulawesi, Indonesia. Certain characters of *Guamampa* and of *Tricheulota*, from the Philippines, are shared by the American genus *Monadenia*. Monadeniinae is elevated to family rank within the Xanthonychoidea.

Key-words. — Gastropoda, Pulmonata, Xanthonychoidea, Monadeniidae, *Guamampa*, Indonesia, systematics.

Guamampa n.g. (Gastropoda, Pulmonata), un Bradybaenidae avec des caractères de Monadeniidae

Résumé. — *Guamampa* n.g. est un nouveau genre de Bradybaenidae Aegistinae défini par un ensemble de caractères de l'appareil génital : une seule glande muqueuse implantée sur le sac du dard; la partie distale du vas deferens très développée; un flagelle d'un type particulier, ressemblant à un poing; la verge pénienne ouverte, présentant un profond sillon; le vagin grand, couvert d'une enveloppe externe résistante. L'espèce-type est *Helix tuba* Albers, 1854, de Sulawesi (= Célèbes) en Indonésie. *Guamampa* et *Tricheulota*, des Philippines, partagent un certain nombre de caractères anatomiques avec le genre Nord-américain *Monadenia*. Le taxon Monadeniinae est élevé au rang de famille à l'intérieur de la superfamille Xanthonychoidea.

Mots-clés. — Gastéropodes, Pulmonés, Xanthonychoidea, Monadeniidae, *Guamampa*, Indonésie, systématique.

A. A. SCHILEYKO, *Institute of Problems of Evolution and Ecology, Leninski Prospect 33, 117071 Moscow, Russia*

INTRODUCTION

The problem of relationships of Eurasian and American helicoid land molluscs has been the subject of number recent discussions (MILLER & NARANJO-GARCIA 1989, 1991; NORDSIECK 1987; SCHILEYKO 1991). The author united Asian Bradybaenidae and American Xanthonychidae under a superfamily Xanthonychoidea (SCHILEYKO 1991). In this group, the condition of the sexual apparatus found in the subfamily Aegistinae is viewed as plesiomorphic when compared with that found in the Bradybaeninae, on one hand, and to Xanthonychinae (Xanthonychidae), on the other hand (SCHILEYKO 1991: 196, fig. 5). The condition observed in the subfamily Monadeniinae, from northwest America, is thus seen as immediately derived from the condition in Xanthonychinae. Conversely, MILLER & NARANJO-GARCIA (1989, 1991) include Monadeniinae

Source : MNHN, Paris

directly into the Asian Bradybaenidae. In this connection, it should be mentioned that more than 100 years ago PILSBRY (1894) pointed out the similarity of the mucus glands of the bradybaenid *Tricheulota*, from the Philippines, and of the American *Monadenia*.

In April 1995 I had an opportunity to dissect the species originally described as *Helix tuba* Albers, 1854 from Sulawesi (= Celebes), Indonesia. Peculiar features in the organisation of the reproductive apparatus lead me to establish a new genus for this species, and to discuss its systematic position and possible phylogenetic relationships.

ABBREVIATIONS

ag	albumen gland;	r	penial retractor muscle;
e	epiphallus;	s	stylophore;
f	flagellum;	sl	spermatheca;
mg	mucus gland;	v	vagina;
p	penis;	vd	vas deferens;
pr	prostate;	vd1	slender proximal part of vas deferens;
ps	penis sheath;	vd2	distal part of vas deferens;
		ve	verge.

Family BRADYBAENIDAE Pilsbry, 1939
Subfamily AEGISTINAE Kuroda & Habe, 1949
GUAMAMPA n.g.

TYPE SPECIES. — *Helix tuba* Albers, 1854.

MATERIAL EXAMINED. — About fifteen specimens (four dissected) from limestone outcrop named Gua Mampu, near Uloe (Kampung Luppang, Desa Cabbeng), 30 km NNE of Watampone, South-West Sulawesi; altitude *c.*50 m. Collected by P. Bouchet, MNHN, 10 September 1991, under leaves of aroids.

ETYMOLOGY. — This genus is named after the locality where the present material was collected.

DESCRIPTION (Fig. 1)

Shell helicoid, depressed, rather thin but solid, somewhat translucent, of about 4.5 whorls; last whorl evenly rounded at periphery and slightly descending in front. Basic colouration consisting of yellow background with two brown or reddish bands above and below periphery; umbilicus encircled by area of same dark colour, in addition, two ill-defined bands, darker than background, one between adapical band and suture, the other between abapical band and circumumbilical area. Band width varies from reduced to hypertrophied. Initial part (0.3-0.4 whorl) of embryonic whorls smooth and polished, subsequently regularly radially wrinkled. Postnuclear surface nearly smooth, densely covered with very short golden hairs arranged in oblique series. Aperture wide, with broadly expanded and reflected whitish or pinkish lip. Umbilicus open, rather narrow. Height 17-20 mm, diameter 30-36 mm.

Talon, a small vesicle on a long slender duct, lying on surface of albumen gland. Vas deferens consisting of two parts: a long slender duct arising from prostate and an enlarged club-shaped portion entering epiphallus apically. Boundary between vas deferens and epiphallus marked by

Source : MNHN, Paris

flagellum of peculiar appearance, somewhat resembling a human fist with extended forefinger. Flagellum containing internally a series of narrow cavities entering the principal lumen of the duct at right angle, or nearly so. Epiphallus cylindrical, penial retractor attached to its middle portion. Apical part of the penis more or less bulbous, containing a verge in form of longitudinally folded fleshy plate, *i.e.* it is not closed, but grooved. Inner surface of distal part of penial tube covered by rows of prismatic tubercles. Stylophore voluminous, the only tubercular-alveolar mucus gland entering its lower part via thin duct; accessory sac absent. Vagina enlarged, with white dense external layer and thick walls filled with loose fibrous tissue. Spermathecal duct nearly cylindrical, spermathecal head lying *in situ* on surface of spermoviduct.

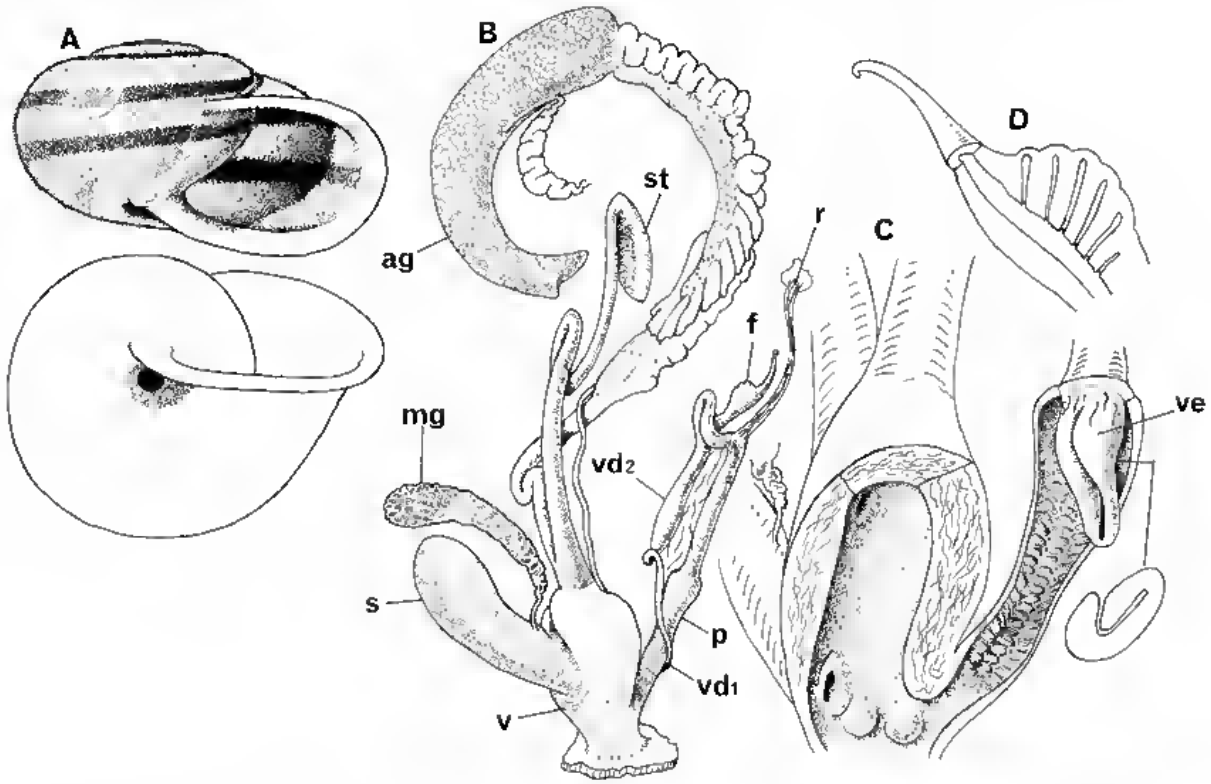


FIG. 1. — *Guamampa tuba*, Gua Mampu, SW Sulawesi, North of Bone (Matapone), P. Bouchet coll., september 1991. A, shell (actual size: height 18,7 mm, diameter 34,4 mm, 4.5 whorls). B, sexual apparatus. C, vagina and penis opened. D, longitudinal section of flagellum.

DISCUSSION

Besides the type species, *Guamampa* probably also include the following nominal species, as described and illustrated by SARASIN & SARASIN (1899): *Helix zonalis* Férussac, 1821; *H. exceptinucula* Beck, 1837, *H. expansa* L. Pfeiffer, 1861, *H. halmaherica* Kobelt, 1892, and *H. surrecta* Kobelt, 1894. All of these, and *H. tuba*, are usually placed in *Planispira* (Camaenidae), see *e.g.* RICHARDSON (1985). However, the occurrence of a stylophore, in association with other morphological genital characters, clearly excludes *Guamampa* from the

Source : MNHN, Paris

Camaenidae and allows its inclusion in the Bradydaenidae. In this family the subfamilies Aegistinae and Bradybaeninae differ by the presence (Aegistinae) or absence (Bradybaeninae) of the flagellum and by the occurrence in the Aegistinae of a small, but closed, tubular verge in the penis. The unusual structure of the flagellum described above and the latter character clearly connects *Guamampa* to the Aegistinae, a subfamily with taxa distributed throughout southern Asia including China, Japan, the Philippines and Indonesia.

From my dissections of *Aegista subchinensis* (Moellendorff, 1884), which is obviously very close to *A. chinensis* (Philippi, 1845), the type species of *Aegista*, the unusual structure of the flagellum described above in *Guamampa* is shared with *Aegista*. However other genital characters allow distinction between the two genera (Figs 2D, 3).

Genital morphology in *Guamampa* also resembles that observed in *Tricheulota* Pilsbry, 1895, type species (OD) *Chloritis spinosissima* Semper, 1880. The history of the type species is a little complicated. SEMPER (1873, pl. 14, figs 9a-b) first illustrated the reproductive anatomy of a species identified by him as *Helix sanziana* Hombron & Jacquinot, 1841. Later (SEMPER 1874, pl. 9, fig. 10) he published an illustration of a shell identified as *Helix sanziana* var. When the relevant text, with reference to the two aforementioned illustrations, was issued much later (SEMPER 1880: 235), Semper had changed the identification to *Chloritis spinosissima* n.sp. Whatever the real identity of the type species is, this would not change the present discussion because *Helix sanziana* and *Tricheulota spinosissima* are congeneric and most probably closely related. Conchological and genital characters are very similar in *Guamampa* and *Tricheulota* (Fig. 2A, B), but the flagellum exhibits the usual conical shape and the enlarged portion of the vas deferens is very short in *Tricheulota*, judging from SEMPER's illustration. (In addition, SEMPER did not show a penial retractor but this was probably not intentional).

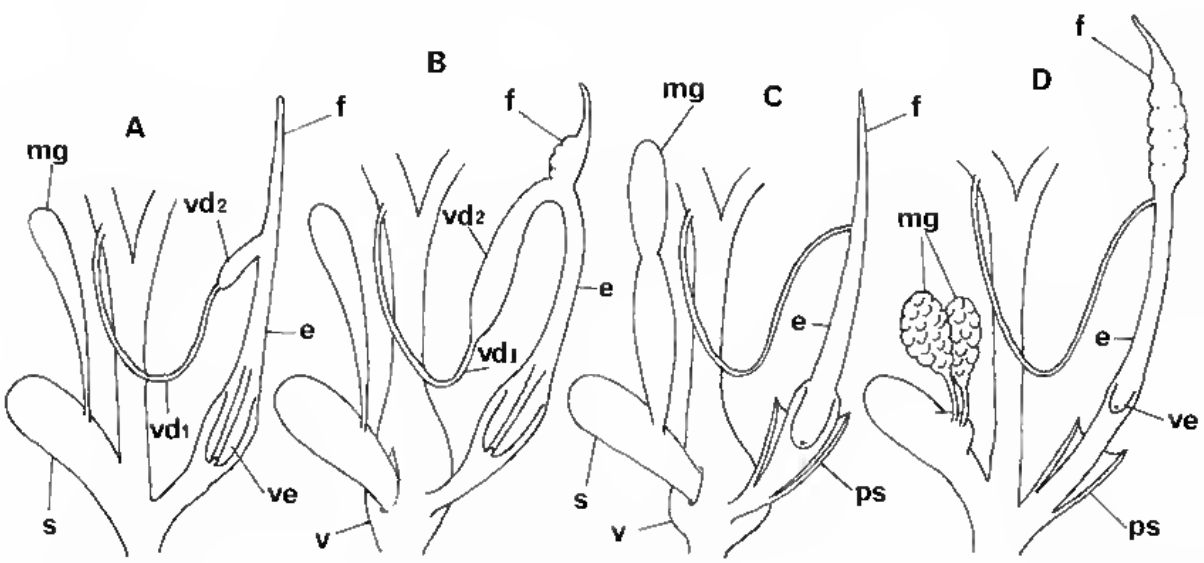


FIG. 2 — Distal parts of genitalia of four genera, schematizised. A, *Tricheulota*. B, *Guamampa*. C, *Monadenia*. D, *Aegista*.

Source : MNHN, Paris

These aegistine genera can be compared to *Monadenia*, the type genus of the subfamily Monadeniinae which belongs to the family Xanthonychidae (Figs 2C, 4). *Monadenia* occurs in northwestern North America, roughly from Alaska to northern California (PILSBRY 1939). I have had the opportunity to dissect *M. infumata* (Gould, 1855) (material from Point Reyes National Seashore Park, Marin Co., California, 19 April 1989, coll. W. B. Miller) and *M. (Shastelix) troglodytes* Hanna & Smith, 1933 (material from Shasta Co., California, 16 August 1969, coll. B. Roth). Genital morphology in these species did not differ significantly from that in published illustrations of *M. fidelis* (Gray, 1834), the type species of the genus (*e.g.* PILSBRY 1939). *Monadenia* exhibits a mosaic of characters and/or character states shared with *Aegista*, *Tricheulota* and *Guamampa* :

– penial sheath and closed verge as in *Aegista*;
– a single club-shaped mucus gland as in *Tricheulota* and *Guamampa*;
– a simple conical flagellum like in *Tricheulota*.

However each taxon shows characters not shared with others:

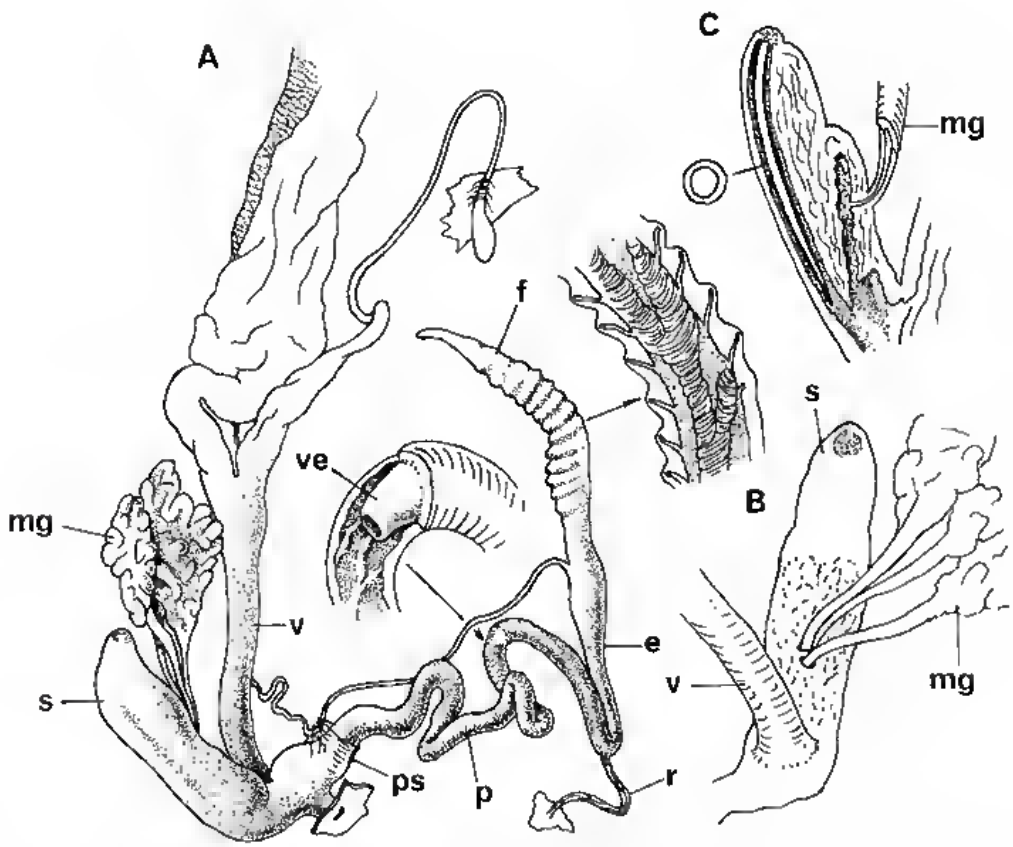


FIG. 3. — *Aegista subchunensis*, Taiwan, SW of Yeh-liu, Taipei Co., C.C. Coney coll., May 14, 1988. A, sexual apparatus (albumen gland omitted). B, stylophore from the other side. C, longitudinal section of stylophore.

Source : MNHN, Paris

– no penial sheath, grooved verge and enlarged distal region of the vas deferens in *Guamampa* and *Tricheulota*;

– occurrence of several mucous glands exhibiting a globular shape and alveolar structure in *Aegista*;

– mucous gland internally lamellar (Fig. 4) and clearly divided into gland proper and muscular duct in *Monadenia*.

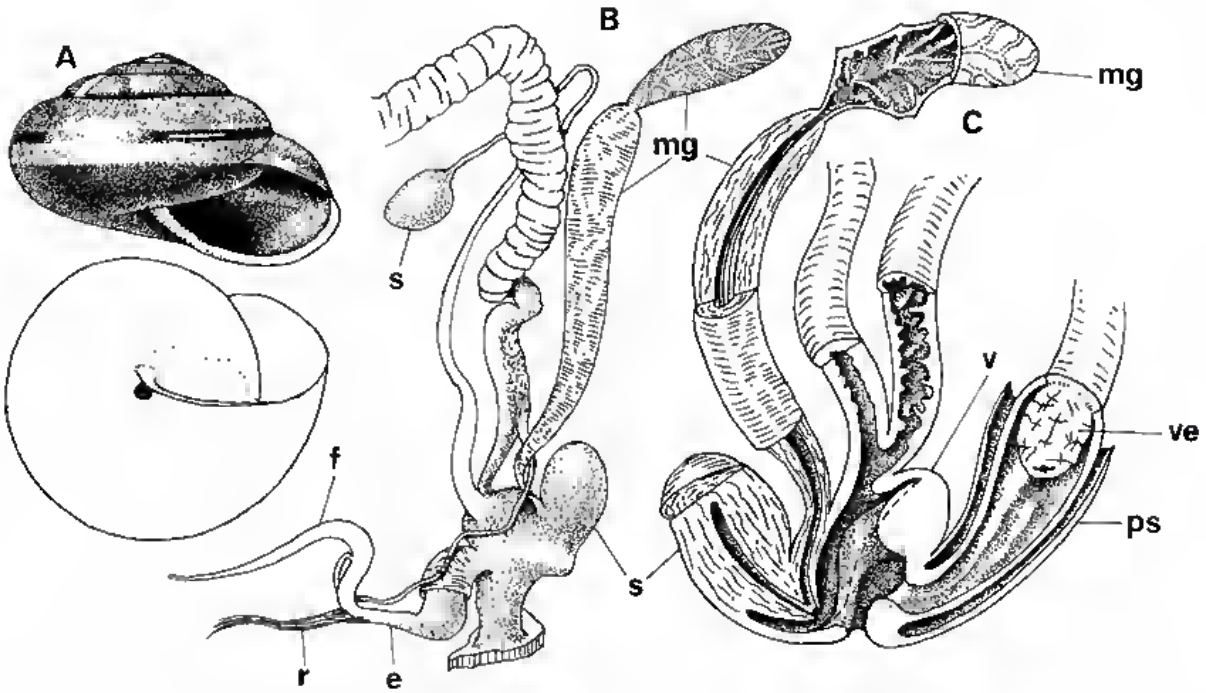


FIG. 4. — *Monadenia fidelis*, Middle Sisters Rock, Oregon, Field Museum of Natural History, Chicago, April 27, 1960. A, shell, B, sexual apparatus (albumen gland omitted). C, distal parts opened.

Guamampa has a single gland with alveolar structure as in *Aegista*, but this gland opens into a single duct as in *Monadenia*, although the duct is very short, slender and hardly muscularized. This duct could represent the first step of a morphocline leading to the condition observed in *Monadenia*, which would imply that the heavily muscular duct observed in *Monadenia* is derived from the basal region of the gland, irrespective of its initial structure. The unusual and complex structure of the lower vagina and atrium observed in *Monadenia* could also easily be derived from, or lead to, the very thick wall and thick external envelope of the homologous regions in *Guamampa*.

By comparison with other helicoid taxa, I propose the following conditions as plesiomorphic / apomorphic in the group of taxa discussed above:

1a. Occurrence of paired mucus glands with alveolar structure, opening into the accessory sac in (*Aegista*) / 1b. Reduction of one mucous gland associated with differentiation of the other

Source : MNHN, Paris

into a basal duct and an upper tubular glandular portion (*Tricheulota*, *Guamampa* and still more in *Monadenia*);

2a. Accessory sac well developed (*Aegista*) / 2b. Reduction of the accessory sac (all other genera discussed above);

3a. Penial verge grooved (*Tricheulota* and *Guamampa*) / 3b. Penial verge closed (tubular) (*Aegista* and *Monadenia*);

4a. Penial sheath present (*Aegista* and *Monadenia*) / 4b. Penial sheath reduced (*Tricheulota* and *Guamampa*);

5a. Flagellum simple, tapering (*Tricheulota* and *Monadenia*) / 5b. Complex structure of flagellum described above (*Aegista* and *Guamampa*);

6a. Vas deferens slender, evenly cylindrical (in *Monadenia* and *Aegista*) / 6b. Vas deferens differentiated into two regions (*Tricheulota* and *Guamampa*);

7a. Walls of the adatrial region with simple structure (*Aegista* and *Tricheulota*) / 7b. Walls of adatrial region thickened and complex in structure (*Guamampa* and still more in *Monadenia*).

When submitted to a procedure of parsimony (Hennig86), this data set resolves monophyly of *Tricheulota* and *Guamampa* (penial sheath reduced and distal vas deferens differentiated), but does not allow resolution of the trichotomy formed by this group, *Monadenia* and *Aegista*. However, similarities and mosaic pattern of character states shown and discussed above suggest close relationships of the Bradybaenidae (*Guamampa*, *Tricheulota*, *Aegista*) and Xanthonychidae (*Monadenia*). This interpretation is reinforced by the occurrence in some North American xanthonychid taxa (*Xanthonyx*, *Metostracon*, *Trichodiscina*, *Miraverellia*) of a pair of mucus gland similar to those observed in *Aegista*. However, in these taxa the glands are not alveolar but exhibit internal anastomosing folds as in *Monadenia*. In consequence, I propose to include the Bradybaenidae in the Xanthonychoidea to which *Monadenia* belongs. As we have come to the conclusion that *Monadenia* was derived independently from ancestors other than those of the rest of american helicoids, its taxonomic rank should be elevated up to family (Monadeniidae). Further investigation should allow reanalysis of this vast set of taxa, and in particular allow exploration of the various biogeographical interpretations of the apparent vicariance of the Bradybaenidae and Xanthonychidae on each side of the Behring strait.

Aknowledgements

I thank Dr P. BOUCHET who collected the material of *Guamampa tuba* and invited me to work as visiting professor in MNHN, and Dr S. TILLIER for his views on the classification discussed in the present paper. I am very much indebted to Dr Walter B. MILLER and Dr Barry ROTH (Santa Barbara Museum of Natural History) and Dr Clifton C. CONEY† (Los Angeles County Museum of Natural History) who gave me a free hand on their material of *Monadenia* and *Aegista*.

Source : MNHN, Paris

REFERENCES

MILLER W. B. & NARANJO-GARCIA E., 1989. — *Familial relationships and biogeography of the Western American and Caribbean Helicoidea (Gastropoda: Pulmonata).* Abstracts of Meeting, Los Angeles, 25-30 June 1989, 40 p.

— 1991. — Familial relationships and biogeography of the Western American and Caribbean Helicoidea (Gastropoda: Pulmonata). *Amer. Mal Bull.* **8** (2): 147-153.

NORDSIECK H., 1987. — Revision des Systems der Helicoidea (Gastropoda: Stylommatophora). *Arch. Moll.* **118** (1/3): 9-50.

PILSBRY H. A., 1890. — *Manual of Conchology*, vol. 6. Philadelphia, 324 p.

— 1894-1895. — *Manual of Conchology*, vol. 9. Philadelphia, 366 + 126 p.

— 1939. — *Land Mollusca of North America (North of Mexico)*, vol. 1, part 1. Philadelphia, xvii + 573 p.

RICHARDSON L., 1985. — Camaenidae: Catalog of species. *Tryonia* **12** : 1-479.

SARASIN P. & SARASIN F., 1899. — *Die Land-Mollusken von Celebes. Materialen zur Naturgeschichte der Insel Celebes*, vol. 2. Wiesbaden, 248 p.

SCHILEYKO A. A., 1991. — Taxonomic status, phylogenetic relations and system of the Helicoidea sensu lato (Pulmonata). *Arch. Moll.* **120** (4/6): 187-236.

SEMPER C., 1873-1880. — *Reisen im Archipel der Philippinen. Wissenschaftliche Resultate*. Band 3 (Landmollusken); Heft 2 (1873): 81-128, pls 11-14; Heft 3 (1874): 129-168, pls 9, 15, 17; Heft 5 (1880): 225-264, pls 1920, 22-23. Wiesbaden.

Source : MNHN, Paris

Bulletin du Muséum national d'Histoire naturelle, Paris, 4e série, 18, 1996
Section A, nos 3-4 : 409-445

A critical review of the trochoidean types in the Muséum d'Histoire naturelle, Bordeaux (Mollusca, Gastropoda)

by David G. HERBERT

Abstract. — The type material of twenty-two nominal species of New Caledonian trochoidean gastropods, housed in the Muséum d'Histoire naturelle, Bordeaux, is discussed. The species were described by FISCHER, LAMBERT, MONTROUZIER and SOUVERBIE in the *Journal de Conchyliologie* from 1858-1879. Lectotypes are designated where more than one specimen is present and the primary types of all are illustrated. In the majority of cases the relationships of the taxa to other tropical western Pacific species require further investigation. Few of the names can be used as the earliest available names with any degree of certainty. New synonyms: *Tectaria montrouzieri* Fischer, 1878 = *Monodonta angulifera* A. Adams, 1853; *Trochus gilberti* Montrouzier *in* Fischer, 1878 = *Ziziphinus polychronus* A. Adams, 1853; *Trochus (Euchelus) fossulatulus* Souverbie *in* Souverbie & Montrouzier, 1875 = *Stomatella cancellata* Krauss, 1848.

Key-words. — Type material, Mollusca, Trochidae, Bordeaux Museum, New Caledonia.

Révision critique des types de Trochoidea néo-calédoniens du Muséum d'Histoire naturelle, Bordeaux (Mollusca, Gastropoda)

Résumé. — Le statut de vingt-deux espèces nominales de Trochoidea indo-pacifiques est révisé sur la base du matériel-type conservé au Muséum d'Histoire naturelle de Bordeaux. Ces taxons, publiés dans le *Journal de Conchyliologie* de 1858 à 1879, ont été décrits de Nouvelle-Calédonie par FISCHER, LAMBERT, MONTROUZIER et SOUVERBIE. Des lectotypes sont désignés chaque fois que le matériel-type est représenté par plusieurs syntypes, et tous les échantillons pertinents sont illustrés. Dans la plupart des cas, l'identité de ces taxons ne peut encore être établie de façon définitive et requiert des comparaisons supplémentaires avec d'autres espèces du Pacifique occidental. Seuls quelques noms paraissent pouvoir être utilisés avec certitude comme les noms valides d'espèces néo-calédoniennes ou à plus large répartition indo-pacifique. Synonymes nouveaux : *Tectaria montrouzieri* Fischer, 1878 = *Monodonta angulifera* A. Adams, 1853; *Trochus gilberti* Montrouzier *in* Fischer, 1878 = *Ziziphinus polychromus* A. Adams, 1853; *Trochus (Euchelus) fossulatulus* Souverbie *in* Souverbie & Montrouzier, 1875 = *Stomatella cancellata* Krauss, 1848.

Mots-clés. — Matériel-type, Mollusca, Trochidae, Muséum Bordeaux, Nouvelle-Calédonie.

D.G. HERBERT, *Natal Museum, Private Bag 9070, Pietermaritzburg, 3200, South Africa*

INTRODUCTION

The Muséum d'Histoire naturelle, Bordeaux (MHNB) [in latin *Museum Burdigalense*], houses an extensive collection of molluscs from the New Caledonian archipelago. The bulk of this material was collected by French Marist missionaries such as R. P. Xavier MONTROUZIER (1820-1897) (CROSSE 1898; O'REILLY 1931) and R. P. Pierre LAMBERT (1823-1903) (H. FISCHER 1904). The majority of new taxa were described in the *Journal de Conchyliologie* by S.-M. SOU-

Source : MNHN, Paris

VERBIE, J.-B. GASSIES, P. FISCHER and H. CROSSE, and also by the missionaries themselves. SOUVERBIE, director of the MHNB, collaborated extensively with MONTROUZIER, particularly in respect to marine molluscs, and frequently co-authored publications with him.

The material in this collection is historically important since it contains the type material of many New Caledonian species. In some instances, particularly where the specimens were numerous, it is evident that additional type material was sent to the Muséum national d'Histoire naturelle, Paris (MNHN), and it is still present in the typothèque there. Otherwise it seems that all the original material was retained in Bordeaux. Not infrequently, however, specimens acquired after the publication of the original descriptions were sent to the MNHN and some of these "*ex auctore*" or "*ex auteur*" specimens have since been accorded type status (FISCHER-PIETTE 1950). Clearly this is not justified.

The MHNB collection seems to have been largely overlooked by subsequent workers, particularly those concerned with marine taxa, and the types have rarely if ever been consulted for verification of identifications. This situation is exacerbated by the museum's present policy of not sending type material out on loan. My personal interest in the MHNB New Caledonian types concerns trochoidean vetigastropods for which, in many cases, the most recent illustrations are those given by FISCHER in KIENER's "*Spécies général*" (FISCHER 1875-1880) and PILSBRY in TRYON's "*Manual of Conchology*" (PILSBRY 1888, 1889, 1890). More recent literature makes occasional reference to some SOUVERBIE and MONTROUZIER names, but as the taxa involved are by and large very poorly known, the identifications are to some extent suspect.

In an attempt to resolve a number of uncertainties regarding Indian Ocean trochids and to obtain photographs of types for comparative purposes, I visited the MHNB. Whilst there I photographed type material of all the trochoidean taxa present, with the intention of publishing the following review.

Since New Caledonia lies near the centre of a very large zoogeographic province, it is likely that endemicity in shallow water habitats is low and that most species are widely distributed. Although the MHNB collections were amongst the earliest from the New Caledonian archipelago (a region which is still being studied extensively and which has an astonishingly rich marine molluscan fauna, BOUCHET *in lit.*), molluscan material was already available from neighbouring areas of the central Indo-West Pacific (*e.g.* in the collection of Hugh Cuming). As a result, it is likely that a significant proportion of the taxa named by the French authors had already been studied and described by earlier workers. Establishing whether or not such is the case, however, is complicated by the paucity of material available and the poor descriptions provided by relatively prolific authors such as A. ADAMS, often with neither locality data nor illustrations. In a number of cases I have been unable come to definite conclusions regarding the validity of the taxa under consideration and resolution of these uncertainties will require comparison of topotypic series and perhaps examination of soft parts. At present few of the names can be used as the earliest available names for distinct taxa with any degree of certainty. Difficulty has also been experienced in trying to assign the taxa to genera, largely because the genera themselves have not yet been adequately defined.

Source : MNHN, Paris

ABBREVIATIONS

AMS	Australian Museum, Sydney;
ANSP	Academy of Natural Sciences, Philadelphia;
BMNH	The Natural History Museum, London;
ICZN	International Code of Zoological Nomenclature;
MHNB	Muséum d'Histoire naturelle, Bordeaux;
MNHN	Muséum national d'Histoire naturelle, Paris;
ZSIC	Zoological Survey of India, Calcutta.

REVIEW

Taxa are listed using their original names and in alphabetical order, by genus, subgenus and species. No other trochoidean types are present in the MHNB and I know of no further trochoidean taxa for which type material should be housed there.

Monodonta fischeri Montrouzier *in* Souverbie & Montrouzier, 1866 (Figs 1-2)

Monodonta fischeri Montrouzier *in* Souverbie & Montrouzier, 1866: 142, pl. 6, fig. 7; FISCHER 1878 *in* 1875-1880: 246, pl. 84, fig. 1. Type loc.: "ins. Art" (New Caledonia).

Euchelus fischeri; PILSBRY 1889: 443, pl. 38, figs 18, 19; KAICHER 1990: 5704.

TYPE MATERIAL. — Two specimens, labelled "types décrits Journ. de Conch. t. 14, p. 4 [*sic*], No. 1 celui figuré pl. 6, fig. 7. Île Art, don. de l'auteur", are present in the MHNB. A further three specimens labelled "syntypes probables" and donated by Montrouzier are present in the MNHN. The original description, however, mentions only four specimens. In order to resolve this discrepancy I designate the figured specimen (No. 1 in the MHNB) as lectotype (Figs 1-2) (dimensions: diameter 3.3 mm, length 4.0 mm). It is whitish with scattered maroon-chestnut spots.

REMARKS

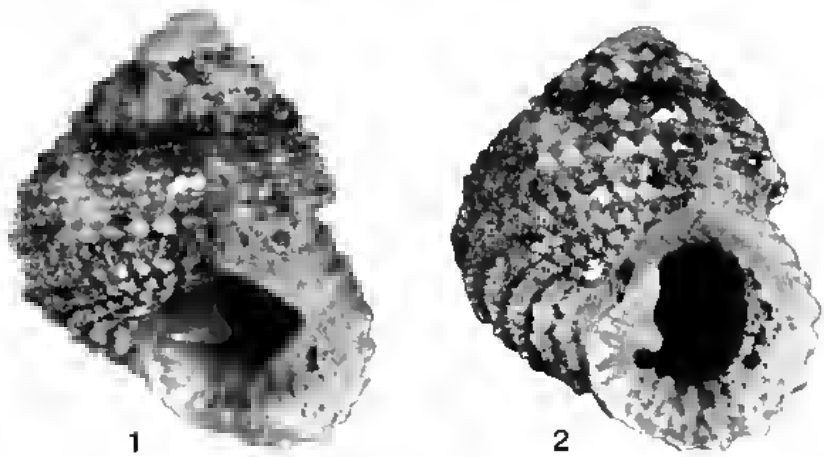
This species clearly belongs in the tribe Chilodontini of the trochoidean subfamily Eucyclinae. It is close to members of *Herpetopoma* Pilsbry, 1889, type species *Euchelus scabriusculus* Adams & Angas, in Angas, 1867, but has a more strongly protruding columella pillar with a strong basal tooth and a weaker upper one. In this respect it resembles a number of Indo-West Pacific taxa such as *Trochus gemmatus* Gould, 1845, *T. instrictus* Gould, 1849, *Monodonta exasperata* A. Adams, 1853, *Euchelus seychellarum* G. & H. Nevill, 1869, and *Clanculus crassilabrum* Sowerby, 1905, which seem to combine shell characters of several chilodontine genera, including *Euchelus*, *Herpetopoma* and "*Agathodonta*". Although it will not be possible to reliably assign these species to genera until the genera themselves have been adequately studied, at present *fischeri* seems best referred to *Herpetopoma.*

Compared with *T. instrictus*, this taxon is much smaller, has a more obviously beaded sculpture and more extensive deposition of callus in the parietal and columella regions, such that the umbilicus is occluded to a greater degree. *C. crassilabrum* is larger and has more numerous

Source : MNHN, Paris

spiral cords with finer granules. *M. exasperata* and *E. seychellarum* are more depressed and have a wider umbilicus.

JANSEN (1994) listed *fischeri* in the synonymy of *Trochus gemmatus* (under *Euchelus* s.l.), but did not provide discussion of the matter. Compared with the present species, Hawaiian (topotypic) material of *T. gemmatus* has a relatively strong cord at the umbilical margin, retains a wider umbilicus at maturity and has more evenly sized spiral cords. In fact, the lectotype of *T. fischeri* resembles more closely the specimens referred by JANSEN to *Euchelus* cf. *gemmatus* which are smaller and have a narrower umbilicus than more typical ones. She did not, however, consider these differences consistent enough to warrant regarding them as a separate species. A more definite conclusion must await further study.



FIGS 1-2. — *Monodonta fischeri* Montrouzier *in* Souverbie & Montrouzier, 1866, lectotype (diameter 3.3 mm, length 4.0 mm).

CONCLUSION

Provisionally referred to *Herpetopoma* (Eucyclinae, Chilodontini); a possible junior synonym of *H. gemmatus* (Gould, 1845).

Rotella montrouzieri Souverbie, 1858
(Figs 3-5)

Rotella montrouzieri Souverbie, 1858: 376; 1860a: 123, pl. 2, fig. 11; FISCHER 1878b: 207; 1879 *in* 1875-1880: 379. Type loc.: "Insula Art" (New Caledonia).

Ethalia guamensis var. *montrouzieri*; PILSBRY 1889: 459, pl. 59, fig. 37.

Ethalia guamensis montrouzieri; KAICHER 1990: 5700.

TYPE MATERIAL. — One specimen, labelled "type décrit et figuré Journ. de Conch. t. 6 [*sic*], p. 376 et t. 8, p. 123, pl. 2, f. 11. Art, don. de l'auteur", is present in the MHNB. This is the holotype (Figs 3-5) (dimensions: diameter 15 mm, length 13 mm). Two further "*ex auteur*" specimens are in the MNHN, but they have no type status since the original description stated that there was only one specimen.

Source : MNHN, Paris

FIGS 3-5. — *Rotella montrouzieri* Souverbie, 1858, holotype (diameter 15 mm, length 13 mm).

REMARKS

FISCHER (1878b) considered *R. montrouzieri* to be no more than a colour variety of *Trochus callosus* Koch *in* Philippi, 1844 (*non* Gmelin, 1791, *nec* Wood, 1828) and at the same time referred the species to a new supraspecific taxon, *Liotrochus*. KOCH's *T. callosus*, however, is itself now regarded as a synonym of *Rotella guamensis* Quoy & Gaimard, 1834, type species of *Ethalia* H. & A. Adams, 1854. PILSBRY (1889) followed FISCHER's proposal and named (1905) two further varieties, *sanguinea* and *selenomphala*, treating these and *montrouzieri* as subspecies of *guamensis*. More recently HICKMAN & MCLEAN (1990) figured *E. guamensis* and *E. montrouzieri* as separate species and HICKMAN (in lit.) has indicated that the *guamensis* complex of taxa (as per PILSBRY) is a heterogeneous group, including both umboniine and non-umboniine taxa. Further work is needed to clarify this issue, but the accompanying figures will help, at least, in defining *montrouzieri*.

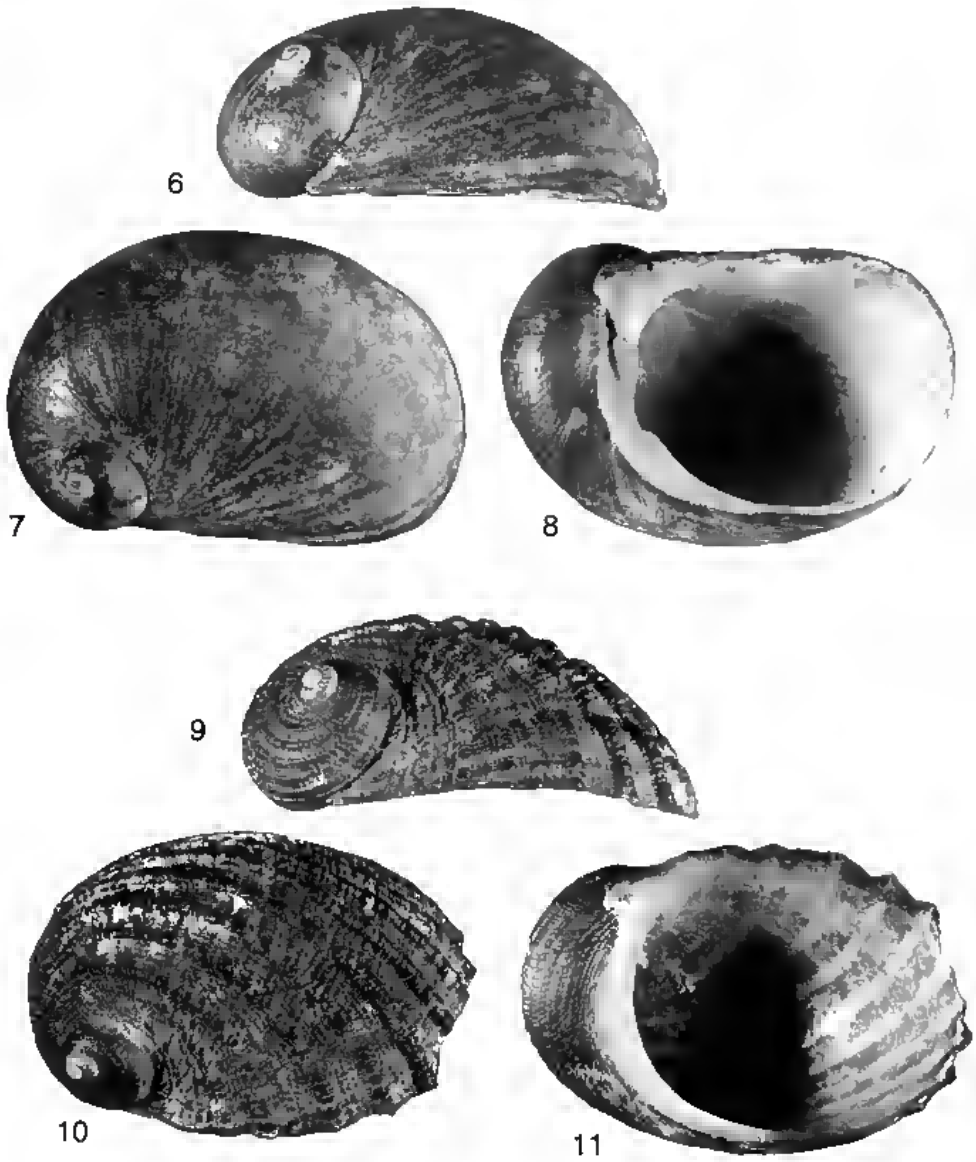
CONCLUSION

Part of the *Ethalia guamensis* species complex, but in need of further study.

Source : MNHN, Paris

Stomatella (Gena ?) crassa Montrouzier *in* Souverbie & Montrouzier, 1870
(Figs 6-8)

Stomatella (Gena ?) crassa Montrouzier *in* Souverbie & Montrouzier, 1870: 74, pl. 9, fig. 6.
Type loc.: "ins. Art" (New Caledonia).
Stomatella (Synaptocochlea) crassa; PILSBRY 1890: 26, pl. 55, figs 22, 23.



FIGS 6-11. — *Stomatella (Gena ?) crassa* Montrouzier *in* Souverbie & Montrouzier, 1870, and *Stomatella granosa* Lambert, 1874. 6-8, *S. crassa*, lectotype (length 10.1 mm, width 6.6 mm); 9-11, *S. granosa*, lectotype (length 5.1 mm, width 3.8 mm).

Source : MNHN, Paris

TYPE MATERIAL. — The original description mentioned two specimens and both remain in the MHNB. The lot is labelled "type décrit Journ. de Conch. t. 18, p. 40 [*sic*], No. 1 celui figuré, pl. 9, f. 6. Île Art, *ex auctore*". The specimen labelled No. 1 is here refigured and designated lectotype (Figs 6-8) (dimensions: length 10.1 mm, width 6.6 mm, height 4.4 mm).

REMARKS

This specimen has very much the appearance of a *Stomatella*. It may well prove to be nothing more than a large, somewhat worn specimen of *Stomatella stellata* Souverbie *in* Souverbie & Montrouzier, 1863, see below. Comparison should also be made with *Gena caledonica* Crosse, 1871.

CONCLUSION

One of many nominal *Stomatella* species (Stomatellinae); its validity requires further study.

Stomatella granosa Lambert, 1874
(Figs 9-11)

Stomatella granosa Lambert, 1874: 374; SOUVERBIE & MONTROUZIER 1875: 35, pl. 4, fig. 2; PILSBRY 1890: 27. Type loc.: "ins. Lifou" (Loyalty Islands, New Caledonia).

TYPE MATERIAL. — The original description stated that there were two specimens, but SOUVERBIE & MONTROUZIER (1875) mentioned only a single exampte and this is the only one now present in the MHNB. It is labelled "type décrit Journ. de Conch. t. 22, p. 374; et t. 23, p. 35, pl. 4, f. 2. Île Lifou, *ex auctore*". There is no additional type material in the MNHN and the second specimen must be considered lost. I here figure and designate the remaining one as lectotype (Figs 9-11) (dimensions: length 5.1 mm, width 3.8 mm, height 2.3 mm).

REMARKS

This is a characteristic species with coarse spiral cords rendered irregularly granular where they are crossed by well-developed growth-lines. Its overall facies is that of *Synaptocochlea* rather than *Stomatella*. Shell coloration is similar to that of *Synaptocochlea caliginosa* (H. & A. Adams, 1864) (of unknown provenance; holotype BMNH 1968: 138, with operculum, Figs 59-61 herein), but *S. granosa* has much coarser spiral sculpture.

CONCLUSION

Evidently referable to *Synaptocochlea* (?Eucyclinae: Chilodontini) and probably a valid species.

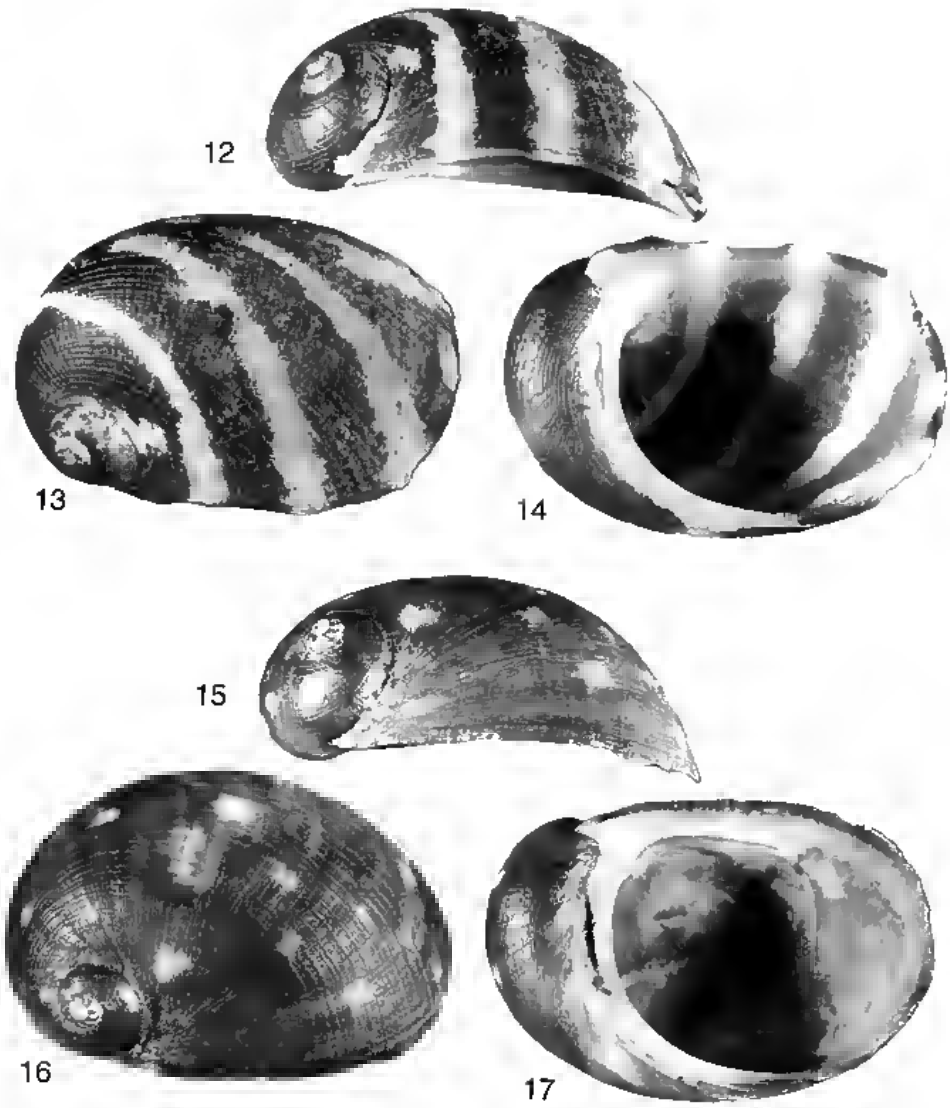
Stomatella picta Montrouzier *in* Souverbie & Montrouzier, 1862
(Figs 12-14)

Stomatella picta (non *Stomatia picta* d'Orbigny, 1842) Montrouzier *in* Souverbie & Montrouzier, 1862: 239, pl. 9, fig. 7. Type loc.: "ins. Art" (New Caledonia).

Source : MNHN, Paris

Stomatella montrouzieri PILSBRY 1890: 27, pl. 53, figs 74-75; nom. nov.

TYPE MATERIAL. — One specimen, labelled "type décrit et figuré Journ. de Conch. t. 18, p. 139, pl. 8, f. 7, île Art, don. de l'auteur", is present in MHNB (dimensions: length 4.7 mm, width 3.0 mm, height 2.2 mm). This specimen fits the dimensions given and matches the figure well, and, since the description stated that there was only one specimen, I consider this to be the holotype (Figs 12-14). There are additional "*ex auctore*" specimens in the MNHN, four in the typothèque and two (including operculum) in the *Journal de Conchyliologie* collection (cited by FISCHER-PIETTE 1950), but these have no type status.



FIGS 12-17. — *Stomatella picta* Montrouzier *in* Souverbie & Montrouzier, 1862, and *Stomatella stellata* Souverbie *in* Souverbie & Montrouzier, 1863. 12-14, *S. picta*, holotype (length 4.7 mm, width 3.0 mm); 15-17, *S. stellata*, holotype (length 7.5 mm, width 4.8 mm).

Source : MNHN, Paris

REMARKS

PILSBRY (1890) considered *Stomatia picta* d'Orbigny, 1842, from the tropical western Atlantic and *Stomatella picta* Montrouzier *in* Souverbie & Montrouzier, 1862, to be congeneric and thus secondarily homonymous, and proposed the replacement name *Stomatella montrouzieri* for the junior name. Regardless of whether or not this secondary homonymy is real (I believe it is), MONTROUZIER's *picta* is permanently invalid (ICZN Art. 59b) and the replacement name is the valid name for the taxon. At the same time, PILSBRY proposed a new supraspecific taxon, *Synaptocochlea*, for small, spirally lirate species otherwise similar to *Stomatella*, and cited *S. montrouzieri* as the type species. The MHNB specimen is thus the holotype of the type species of *Synaptocochlea* Pilsbry, 1890.

Most authors have accepted *Synaptocochlea* as a generically distinct taxon and have referred it, together with *Stomatella*, to the Stomatellinae/Stomatellidae (*cf.* KEEN 1960). *Synaptocochlea* species are smaller than those of *Stomatella*, lack an obvious interior nacreous layer, have fewer whorls, a coarser spiral sculpture that is rendered somewhat granose by growth-lines and retain an operculum. More recently, HICKMAN & MCLEAN (1990) have indicated that the genus is not in fact stomatelline, and should be referred to the Eucyclinae (tribe Chilodontini).

The relationships of *S. montrouzieri* to other species of *Synaptocochlea*, particularly the widespread Indo-West Pacific *S. concinna* (Gould, 1845), need to be investigated. At first glance *S. montrouzieri* appears to have a finer, less obviously beaded sculpture and (the type at least) has a bold colour pattern that lacks the red spiral lines/flecks so common in *S. concinna*. However, the range of variation shown in *S. concinna* is extensive, particularly in respect of coloration, and *S. montrouzieri* may well prove to fall within this when studied in detail. *S. picta* d'Orbigny, 1842, also merits comparison with *S. concinna* as it too is of very similar appearance. ABBOTT (1958) has suggested that *concinna* should be treated as no more than a subspecies of *picta*.

CONCLUSION

Type species of *Synaptocochlea* Pilsbry, 1890 (?Eucyclinae, Chilodontini), and probably a synonym of *S. concinna* (Gould, 1845).

Stomatella stellata Souverbie *in* Souverbie & Montrouzier, 1863
(Figs 15-17)

Stomatella stellata Souverbie *in* Souverbie & Montrouzier, 1863a: 169, pl. 5, fig. 10; PILSBRY 1890: 25, pl. 53, figs 76, 77, pl. 2, figs 35-37 (var. *ornatissima*); HEDLEY 1901: 128; 1909: 353. Type loc.: "ins. Art" (New Caledonia).

Gena stellata; MELVILL & STANDEN 1895 *in* 1895-1897: 126.

Synaptocochlea stellata; CERNOHORSKY 1978: 37, text-fig. 4; WILSON 1993: 69.

TYPE MATERIAL. — One specimen, labelled "type décrit et figuré en Journ. de Conch. 1. 11, p. 6, pl. 5, fig. 1[*sic*]. Île Art, don. de l'auteur", is present in the MHNB (dimensions: length 7.5 mm, width 4.8 mm, height 3.2 mm). A further two specimens, "*ex auctore*", are present in the MNHN. Since the original description stated that only a single specimen had been seen and the MHNB specimen (Figs 15-17) matches both the figure and dimensions given reasonably well, I regard it as the holotype and consider the MNHN specimens to have no type status.

Source : MNHN, Paris

REMARKS

CERNOHORSKY (1978) referred this species to *Synaptocochlea*, but it is difficult to be certain whether this was justified. There are features of the shell, in particular its finer sculpture, which suggest that the original referral to *Stomatella* may in fact be correct. The spiral lirae, although crossed by growth-lines, are not rendered granose by them. There is, in addition, some trace of nacre on the interior. A more conclusive appraisal must await examination of the soft parts of topotypic material.

PILSBRY (1890) placed *Stomatella ornata* Brazier, 1877, described from north-eastern Australia, in synonymy with this species. However, operculae glued inside the apertures of the four syntypes of *S. ornata* in the AMS (one here figured, Figs 62-64), ally that taxon with *Synaptocochlea*. See also remarks above regarding *Stomatella (Gena ?) crassa* Montrouzier, 1870.

CONCLUSION

Probably a species of *Stomatella* (Stomatellinae); its validity requires further study.

Tectaria montrouzieri Fischer, 1878
(Figs 18-19)

Tectaria montrouzieri Fischer, 1878c: 212; SOUVERBIE & MONTROUZIER 1879: 31, pl. 3, fig. 6. Type loc.; "île Art" (New Caledonia).

Turcica montrouzieri; HEDLEY 1909: 354.

TYPE MATERIAL. — FISCHER indicated the original material to be in the "Mus. Burdigalense", but did not specify the number of specimens. SOUVERBIE & MONTROUZIER (1879) later stated that there was only one. This remains in the MHNB and must be regarded as holotype (Figs 18-19); its dimensions correspond with those given by FISCHER in the original description (diameter 7.4 mm, length 10.2 mm). It is labelled "type décrit Journ. de Conch. t. 26, p. 212 et t. 27, p. 31, pl. 3, f. 6. Souverbie – île Art, *ex auctore*". A further specimen "ex auteur" is present in the MNHN, but it has no type status.

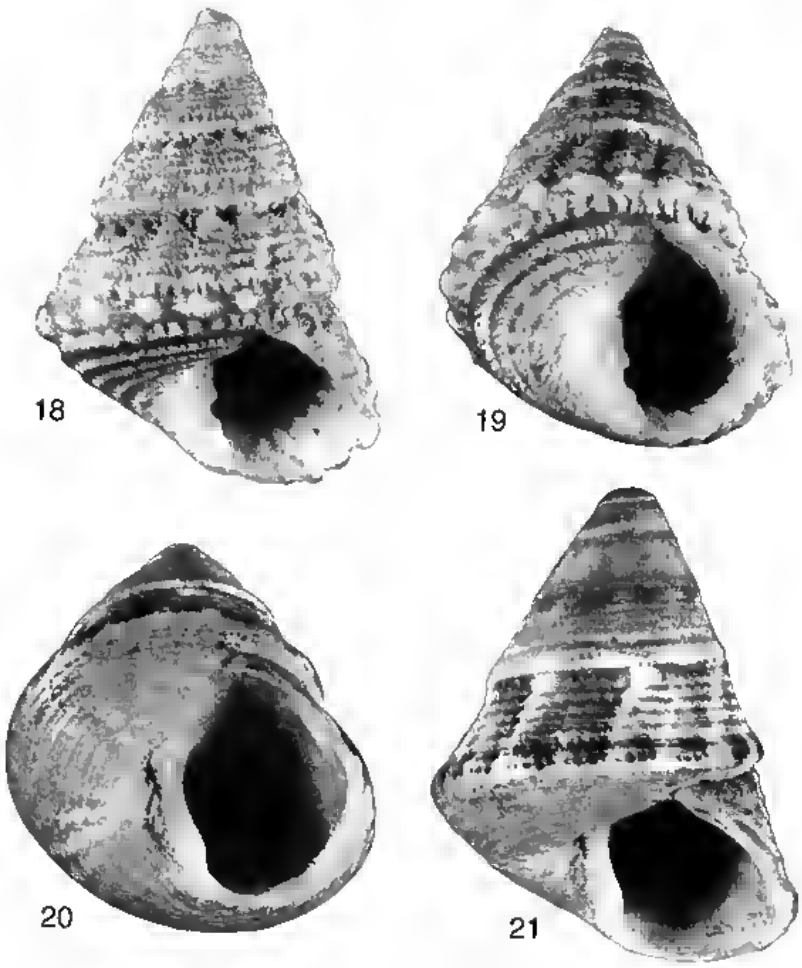
REMARKS

This species was not mentioned by ROSEWATER (1972) in his revision of the Indo-Pacific Tectariinae, even as a dubious or excluded taxon. Its original placement in *Tectaria*[*us*] was erroneous and it should instead be referred to the Trochidae (*cf.* HEDLEY 1909). The holotype is very similar to the type material of *Monodonta angulifera* A. Adams, 1853, from the Philippines (three syntypes, BMNH 1968215) and is clearly conspecific therewith (HERBERT in prep.). *M. angulifera* is the type species of the chilodontine genus *Perrinia* H. & A. Adams, 1854 (*s.d.* PILSBRY 1889).

CONCLUSION

A junior synonym of *Monodonta angulifera* A. Adams, 1853, type species of *Perrinia* H. & A. Adams, 1854 (Eucyclinae, Chilodontini).

Source : MNHN, Paris



FIGS 18-21. — *Tectaria montrouzieri* Fischer, 1878, and *Trochus artensis* Fischer, 1878. 18-19, *Tectaria montrouzieri*, holotype (diameter 7.4 mm, length 10.2 mm), 20-21, *Trochus artensis*, holotype (diameter 7.9 mm, length 10.2 mm).

Trochus artensis Fischer, 1878
(Figs 20-21)

Trochus artensis Fischer, 1878b: 208. Type loc.: "l'île Art" (New Caledonia).
Cantharidus artensis; PILSBRY 1889: 129.

TYPE MATERIAL. — The single "Musée de Bordeaux" specimen cited in the original description remains in the MHNB (Figs 20-21). It must be considered the holotype (dimensions: diameter 7.9 mm, length 10.2 mm). It is labelled "type décrit Journ. de Conch. t. 26, p. 208, non figuré. Île Art, *ex auctore*".

REMARKS

There is no previous illustration of this taxon. The holotype is a badly worn specimen belonging within the *Thalotia-Calthalotia-Prothalotia* complex. It has a weak bulge at the base

Source : MNHN, Paris

of the columella and there is a fine granulation on the spiral cords. It is patterned with opisthocline, maroon, axial flames on a near white ground. PILSBRY (1889) merely translated FISCHER's original diagnosis and remarks, adding nothing to our knowledge of the taxon. HEDLEY (1908) suggested that it might be a synonym of *Thalotia crenellifera* A. Adams, 1853, from northern Australia; however, his figure of the BMNH type of that species indicates it [*crenellifera*] to be more elevated and to have a stronger columella tooth (see remarks under *Trochus gilberti*).

Other similar taxa include *Trochus (Ziziphinus) arruensis* Watson, 1880, from the Arrou [Aru] Islands (Arafura Sea), *Thalotia marginata* Tenison-Woods, 1880, and *Trochus (Thalotia) torresi* Smith, 1884, both from northern Australia. These appear to differ somewhat from *artensis*, judging from the types and original descriptions, but without good series of topotypic material by which to assess intraspecific variability it is impossible to meaningfully evaluate these differences. Before the true identity and relationships of this species can be established, fresh material will need to be studied and compared with a range of cantharidine species from the central Indo-West Pacific.

CONCLUSION

Fresh, topotypic material requires comparison with other tropical western Pacific cantharidine taxa (Trochinae, Cantharidini).

Trochus constellatus Souverbie *in* Souverbie & Montrouzier, 1863
(Figs 22-25)

Trochus constellatus Souverbie *in* Souverbie & Montrouzier, 1863b: 279, pl. 12, fig. 3; FISCHER 1878 *in* 1875-1880: 271, pl. 90, fig. 1. Type loc.: "Balade et ins. Art" (New Caledonia).

Monodonta constellata; PILSBRY 1889: 108, pl. 35, figs 9, 10, pl. 62, figs 69-71.

TYPE MATERIAL. — The original description cited "Mus. Burdigalense" and indicated that there were eleven specimens, two of which remain in the MHNB, labelled "types décrits Journ. de Conch. t. 11, p. 279, No. 1 celui figuré, pl. 12, fig. 3, No. 2 sujet de la note, don de l'auteur. Île Art et Balade". An additional twelve specimens labelled as types are present in the MNHN (five cited by FISCHER-PIETTE 1950), but since this exceeds the number cited originally, some must be specimens sent to Paris subsequent to the publication of the description. Unfortunately, the status of all these MNHN specimens as types is thus compromised. The MHNB specimen labelled No. 1 is here refigured (Figs 22-25) and designated lectotype (dimensions: diameter 7.9 mm, length 7.1 mm).

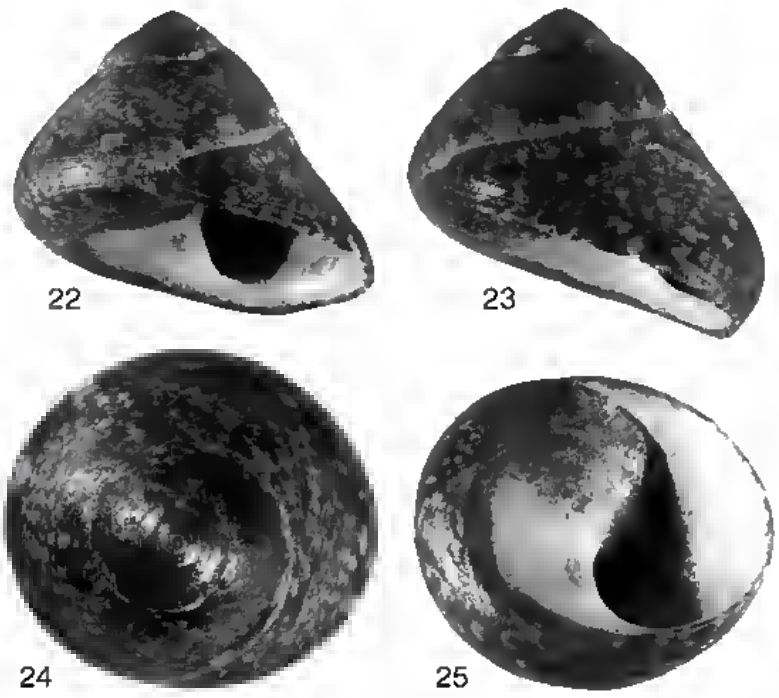
REMARKS

This species clearly belongs to the gibbuline genus *Diloma* Philippi, 1845, and was in fact referred there by FISCHER (1879 *in* 1875-1880). Its small size, globose-conical profile, smooth columella and concave base suggest a relationship with the subgenus *Cavodiloma* Finlay, 1926, type species *Diloma coracina* (Philippi, 1851) from New Zealand. The latter has a well-developed ridge on the base extending from the columella-basal lip junction, around the margin of the basal concavity; this is scarcely evident in *T. constellatus*.

Source : MNHN, Paris

CONCLUSION

A species of *Diloma* Philippi, 1845 (Trochinae, Gibbulini), probably belonging to subgenus *Cavodiloma* Finlay, 1926. The question of validity must await comparison with other members of the genus.



FIGS 22-25. — *Trochus constellatus* Souverbie, *in* Souverbie & Montrouzier, 1863, lectotype (diameter 7.9 mm, length, 7.1 mm).

Trochus gilberti Montrouzier *in* Fischer, 1878
(Figs 26-27)

Trochus gilberti Montrouzier *in* Fischer, 1878b: 207. Type loc.: "l'île Art" (New Caledonia).

Trochus giliberti (unjustified emendation) Souverbie & Montrouzier, 1879: 33, pl. 3, fig. 7; FISCHER 1879 *in* 1875-1880: 401, pl. 119, fig. 2.

Cantharidus giliberti; PILSBRY 1889: 128, pl. 45, figs 37, 38; SCHEPMAN 1908: 41, pl. 9, fig. 4 (radula); CERNOHORSKY 1978: 34, pl. 8, fig. 10.

Cantharidus (Cantharidus) gilberti; ADAM & LELOUP 1938: 19, pl. 2, fig. 7.

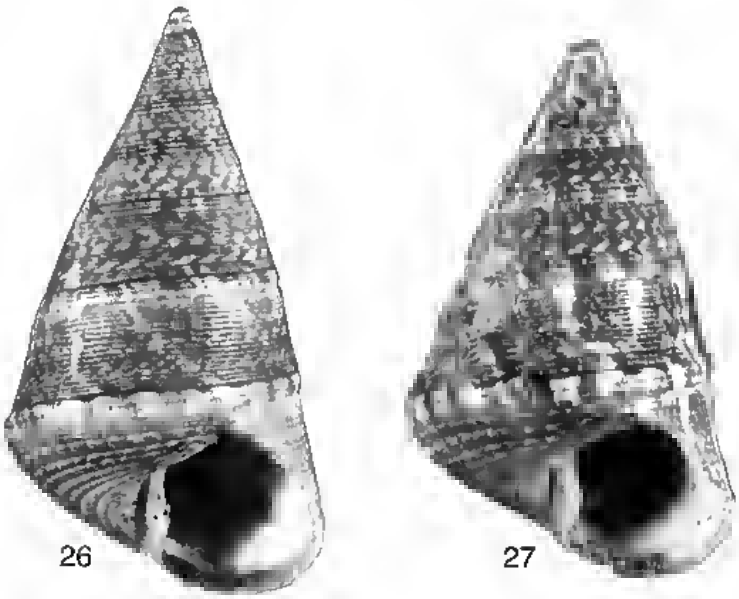
Cantharidus (Jujubinus) gilberti; SPRINGSTEEN & LEOBRERA 1986: 34, pl. 5, fig. 4.

Jujubinus gilberti; WILSON 1993: 80.

TYPE MATERIAL. — Two specimens, labelled "types décrits Journ. de Conch. (Fischer) t. 26, p. 207 et t. 27 (Montrouzier) t. 27 [*sic*], p. 33, f. 7. Île Art, *ex auctore*", are present in the MHNB (Figs 26-27). No indication of the number of specimens originally available was given in FISCHER (1878b), but SOUVERBIE & MONTROUZIER

Source : MNHN, Paris

(1879) indicated that there were only two and figured both. The larger specimen, which is in better condition (Fig. 26), is designated lectotype (length 12.8 mm). A further six specimens, "*ex auteur*", are present in the MNHN, but they have no type status.



FIGS 26-27. — *Trochus gilberti* Montrouzier *in* Fischer, 1878; 26, lectotype (length 12.8 mm); 27, paralectotype (length 11.7 mm).

REMARKS

SOUVERBIE & MONTROUZIER (1879) stated that the species was named in honour of the Reverend Father GILIBERT and that the original spelling given (FISCHER 1878b) was incorrect. However, there was nothing in the original publication to indicate that such patronymy was intended and therefore, in terms of ICZN Art 32c(ii), it cannot be classed as an incorrect original spelling and the name must thus be used in its original form. *Trochus giliberti*, following ICZN Art 33b(iii), should be regarded as an unjustified emendation with its own author and date (*i.e.* SOUVERBIE & MONTROUZIER 1879), and is a junior objective synonym of *T. gilberti*. This situation is unfortunate, but compliance with ICZN (1985) offers no defensible alternative.

T. gilberti is synonymous with *Ziziphinus picturatus* and *Z. polychromus*, both described from the Philippines by A. Adams (1853). The synonymy of these two simultaneously published taxa was noted by PONDER (1978) who afforded *Ziziphinus polychromus* precedence. The syntypes of both are in the BMNH (*Z. polychromus* BMNH 1968111, four specimens; *Z. picturatus* BMNH 196844, two specimens), those of *Z. polychromus* are in better condition; lectotypes of both are here designated and figured (Figs 65, 66). *Cantharidus (Jujubinus) tristis* Thiele, 1930, described from north-western Australia, is a further synonym (PONDER 1978) and so too may be the northern Australian *Thalotia crenellifera* A. Adams, 1853 (*cf.* WILSON 1993).

The shell is elevated conical, with a strong peripheral spiral cord (usually shallowly bifid) and fine incised spiral striae on the adapical surface; the base is rather more coarsely lirate, the umbilicus narrow or closed and there is a denticle of rather variable prominence at the base of the columella. The ground colour is usually red or green and is very variably patterned with

Source : MNHN, Paris

white axial flames, zig-zags and/or flecks. Comparison of Figs 26-27 with Figs 65-66 shows the spiral striation of the *gilberti* types to be more close-set than that of *polychromus* or *picturatus*, but this is evidently a variable character within the species.

Trochus fournieri Crosse, 1863, also from New Caledonia, is similar but, judging from the holotype (BMNH 1896.12.1.9), is smaller in relation to the number of whorls, has a more evenly rounded periphery, lacks a basal columella denticle and has a bright green internal iridescence (Fig. 67). *Komaitrochus pulcher* Kuroda & Taki, 1958, from southern Japan, is broader, lacks an enlarged peripheral spiral cord and has much finer, almost obsolete spiral sculpture above the periphery.

The generic affinities of this species are problematic. It clearly belongs within the *Cantharidus-Jujubinus-Thalotia-Komaitrochus* complex, but supraspecific taxa within this group are not yet sufficiently well defined as to permit a definite statement. The species was recorded from a number of localities in Indonesia by SCHEPMAN (1908) and it will probably prove to be distributed throughout the central western Pacific.

CONCLUSION

A junior synonym of *Ziziphinus polychromus* A. Adams, 1853 (Trochinae, Cantharidini); generic affinity uncertain.

Trochus reevei Montrouzier *in* Souverbie & Montrouzier, 1866
(Figs 28-31)

Trochus reevei Montrouzier *in* Souverbie & Montrouzier, 1866: 141, pl. 6, fig. 8; FISCHER 1875: 49; 1878 *in* 1875-1880: 327, pl. 102, fig. 2. Type loc.: "ins. Art" (New Caledonia).

Gibbula reevei; PILSBRY 1889: 229, pl. 32, figs 59, 60.

TYPE MATERIAL. — The original description stated that there were eight examples; two of these remain in the MHNB labelled "types décrits Journ. de Conch. t. 14, p. 141, No. 1 celui figuré pl. 6, f. 8. Île Art, don. de l'auteur". The other six were sent to Paris by MONTROUZIER and are in the MNHN. All may be considered syntypes. The two MHNB specimens have become detached from the original board and it is now impossible to establish which was No. 1. None the less, they are very similar and both in good condition, obviously live taken. The one with the more well-developed apertural dentition is here illustrated and designated lectotype (Figs 28-31) (dimensions: diameter 7.5 mm, length 6.0 mm).

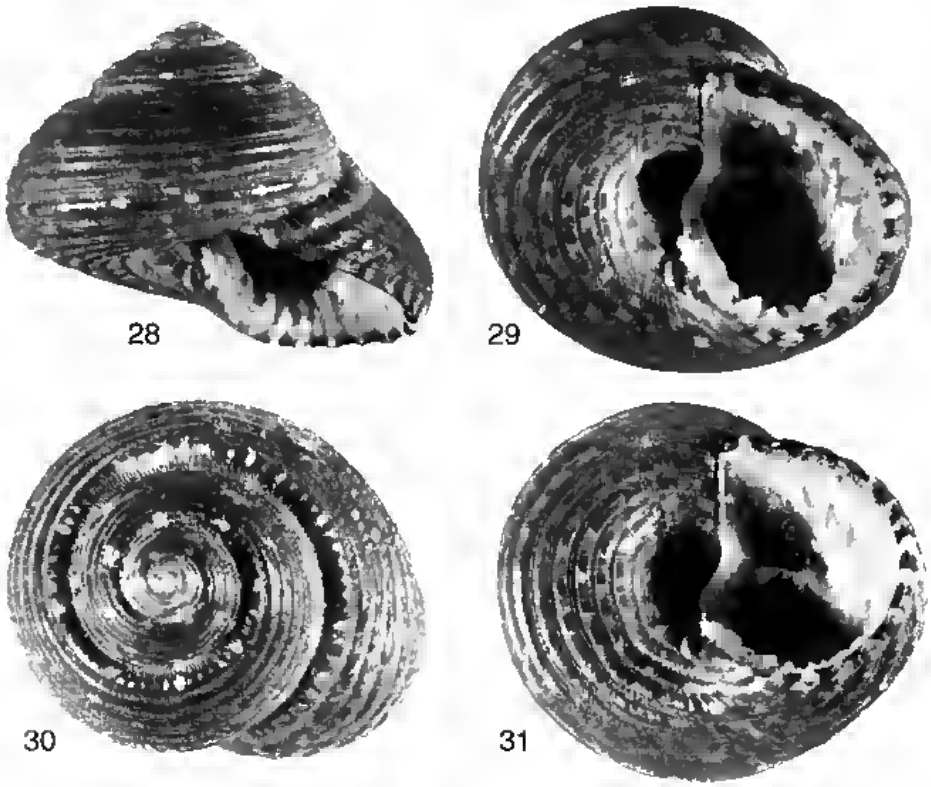
REMARKS

This species superficially resembles members of the genus *Clanculus* Montfort, 1810, but lacks both a columella disjunction and strong columella teeth. In sculpture and apertural dentition it resembles *Clanculus danieli* Crosse, 1862, the type species of *Eurytrochus* Fischer, 1879, and was in fact listed thereunder by FISCHER (1879 *in* 1875-1880: 417). *Eurytrochus* comprises a small, but seemingly well defined group of trochids from the central Indo-West Pacific (Japan to New South Wales and India to Samoa) and is probably worthy of recognition at generic level.

Trochus (Clanculus) bathyraphe Smith, 1876, described from the nearby Solomon Islands, is extremely similar to *T. reevei*, even to the extent of having a turquoise-green tinted apex.

Source : MNHN, Paris

It differs, however, in having much more obviously beaded spiral cords (two syntypes BMNH 76.1.10.62, Figs 68-69). More material is needed in order to establish whether these forms differ consistently in this respect or whether they simply represent opposite ends of a graded series including specimens with intermediate sculpture.



FIGS 28-31. — *Trochus reevei* Montrouzier *in* Souverbie & Montrouzier, 1866, lectotype (diameter 7.5 mm, length 6.0 mm).

CONCLUSION

A member of the genus *Eurytrochus* Fischer, 1879 (Trochinae, ?Gibbulini), and almost certainly a valid name; perhaps an earlier name for *Trochus bathyraphe* Smith, 1876.

Trochus scrobiculatus Souverbie *in* Souverbie & Montrouzier, 1866
(Figs 32-33)

Trochus scrobiculatus Souverbie *in* Souverbie & Montrouzier, 1866: 140, pl. 6, fig. 9; FISCHER 1878 *in* 1875-1880: 248, pl. 84, fig. 2. Type loc.: "ins. Art" (New Caledonia).

Euchelus scrobiculatus; PILSBRY 1889: 437, pl. 38, figs 2, 3; HIDALGO 1904-1905: 256; DAUTZENBERG & BOUGE 1933: 406; FRANC 1956: 23; MASTALLER 1979: 31.

Source : MNHN, Paris

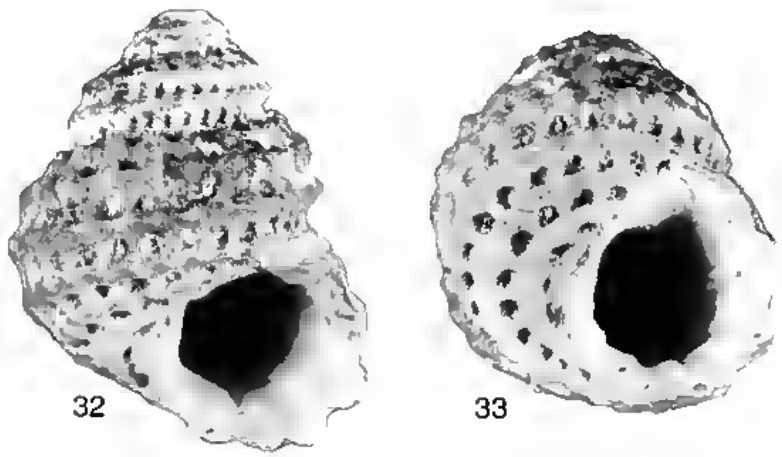
TYPE MATERIAL. — Two examples (Mus. Burdigatense) were mentioned in the original description and two remain in the MHNB, labelled "types décrits Journ. de Conch. t. 14, p. 140, No. 1 celui figuré pl. 6, f. 9. Île Art, *ex auctore*". The one identified as the figured specimen is here refigured and designated lectotype (Figs 32-33) (dimensions: diameter 5.4 mm, length 6.5 mm). No type material is present in the MNHN.

REMARKS

This name is one of a number given to a group of small, white, cancellate, chilodontine species from a range of localities in the Indo-West Pacific. The group appears to be divisible into at least two subgroups, depending upon whether or not there are ridge-like denticles inside the outer lip when mature, but at present it is not clear whether each of the described taxa represent good species or whether a smaller number of somewhat variable species is involved. *T. scrobiculatus* belongs with those in which such denticles are present, and is thus allied to *Monodonta foveolata* A. Adams, 1853, from Lord Hood's Island (Marutéa Atoll, Tuamotu Archipelago), and *Turbo semilugubris* Deshayes, 1863, from La Réunion. Species which do not seem to develop these apertural denticles include *Monodonta clathrata* A. Adams, 1853, from the Philippines, and *Euchelus cavernosus* Sowerby, 1905, from Sri Lanka. *Euchelus favosus* Melvill & Standen, 1896, from the Loyalty Islands, also probably belongs in this group, but the figured syntype (Manchester Museum) is too juvenile to assess.

Turbo semilugubris differs from *Trochus scrobiculatus* in being smaller, in possessing an umbilicus and in having a bold colour pattern (MNHN syntype, Figs 70-71). *Monodonta foveolata* is more similar in size, but, judging from the lectotype (Figs 72-73, BMNH 1968071/1, designated MARSHALL 1979), has an open (albeit narrow) umbilicus, is more depressed and has less deeply cancellate sculpture. The significance of the apparent differences between *T. scrobiculatus* and *M. foveolata*, however, needs to be assessed in terms of intraspecific variation.

An element of confusion has surrounded the generic affinity of these taxa. The overall shell facies is similar to that of *Vaceuchelus* Iredale, 1929, the type species of which is *Euchelus*



FIGS 32-33. — *Trochus scrobiculatus* Souverbie *in* Souverbie & Montrouzier, 1866, specimen identified as figured specimen, here designated lectotype (diameter 5.4 mm, length 6.5 mm).

Source : MNHN, Paris

angulatus Pease, 1868, from "ins. Annaa" (= Anaa Atoll, Tuamotu Archipelago). PILSBRY (1889), in contrast to IREDALE (1929), believed *E. angulatus* to be no more than a variety of *M. Foveolatus* and MELVILL & STANDEN (1901) followed suit. The two were regarded as distinct species by MARSHALL (1979) on the grounds that *E. angulatus* lacked denticles inside the aperture. The figure of the lectotype recently provided by JOHNSON (1994, pl. 7, fig. 13) is too small to permit this observation to be confirmed, but personal examination of the lectotype (ANSP 40671), in fact, reveals such denticles to be present inside the outer lip (Figs 74, 75). There can be little doubt therefore, that *T. scrobiculatus* is referable to *Vaceuchelus*. Members of this genus differ from those of *Herpetopoma* Pilsbry, 1889, in lacking a deep notch between the denticles at the junction of the basal and columellar lips, and in having a generally coarser sculpture.

The lectotype of *Euchelus angulatus* has a relatively narrow supra-peripheral spiral cord which lies closer to the peripheral cord than does the sub-peripheral one, and has a steeply sloping shoulder (Figs 74, 75); in this respect it differs from the types of *T. scrobiculatus* and *M. foveolata*. However, until such time as a good topotypic series can be compared, the question of the validity of these nominal taxa remains unresolved.

CONCLUSION

A species of *Vaceuchelus* Iredale, 1929 (Eucyclinae, Chilodontini), but specific validity requires further study.

Trochus (Euchelus) fossulatulus Souverbie *in* Souverbie & Montrouzier, 1875
(Figs 34-35)

Trochus (Euchelus) fossulatulus Souverbie *in* Souverbie & Montrouzier, 1875: 39, pl. 4, fig. 5; G. & H. NEVILL 1875: 103; FISCHER 1876: 151; 1879 *in* 1875-1880: 391, pl. 117, fig. 2. Type loc.: "ins. Art" (New Caledonia).

Euchelus fossulatus [sic]; PILSBRY 1889: 444, pl. 38, figs 15, 16; HEDLEY 1915: 710.

TYPE MATERIAL. — The two specimens mentioned in the original description remain in the MHNB. They are labelled "types décrits Journ. de Conch. t. 23, p. 39, No. 1 celui figuré, pl. 4, f. 5. Île Art, *ex auctore*". Specimen No. 1 is here refigured (Figs 34-35) and designated lectotype (dimensions: diameter 9.4 mm, length 8.3 mm). There is no material in the MNHN.

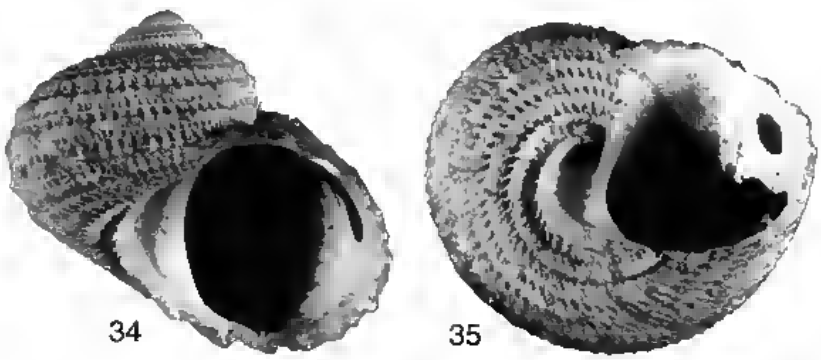
REMARKS

PILSBRY (1889) correctly referred this species to his new taxon *Hybochelus*, noting that it differed from the type species, *Hybochelus cancellatus* (Krauss, 1848), in having a slightly more prominent spire. I can find nothing to indicate that more than one species is involved and thus regard *T. fossulatulus* as a junior synonym of *H. cancellatus*, as suggested by HEDLEY (1915). PILSBRY's description of his *H. cancellatus orientalis* (Pilsbry, 1904), from Japan, fits the types of *fossulatulus* extremely well, but I think it unlikely that such subspecific distinction is justified. The taxon is evidently distributed over a wide section of the central Indo-West Pacific, from Japan to the Philippines, Andaman Islands and New Caledonia, and probably further. It differs

Source : MNHN, Paris

from *H. mysticus* (Pilsbry, 1889) and *H. sagamiensis* Kuroda & Habe, 1971, in having a relatively wide umbilicus.

The South African locality (Table Bay) given in Krauss's original description of *H. cancellatus* is erroneous; no tropical Indo-West Pacific trochids are known to occur there. In fact, there have been no subsequent reports of the species in southern or eastern Africa as a whole.



FIGS 34-35 — *Trochus (Euchelus) fossulatulus* Souverbie *in* Souverbie & Moutrouzier, 1875, specimen identified as figured specimen, here designated lectotype (diameter 9.4 mm, length 8.3 mm).

CONCLUSION

A synonym of *Stomatella cancellata* Krauss, 1848, type species of *Hybochelus* Pilsbry, 1889 (Eucyclinae, Chilodontini).

Trochus (Euchelus) lamberti Souverbie *in* Souverbie & Montrouzier, 1875
(Figs 36-37)

Trochus (Euchelus) lamberti Souverbie *in* Souverbie & Montrouzier, 1875: 37, pl. 4, fig. 4; G. & H. NEVILL 1875: 102; FISCHER 1876: 151; 1878b: 210; 1879 *in* 1875-1880: 385, pl. 116, fig. 2. Type loc.: "Insula Nou" (New Caledonia).

Euchelus lamberti; HEDLEY 1907: 479; 1915: 710.

TYPE MATERIAL. — The single specimen mentioned in the original description remains in the MHNB (Figs 36-37); it must be considered the holotype (dimensions: diameter 9.0 mm, length 8.7 mm). It is labelled "type décrit Journ. de Conch. t. 13, p. 37, pl. 4, f. 4, et figuré dans Kiener [pl. 116, fig. 2]. Île Nou, *ex auctore*". There is no material in the MNHN.

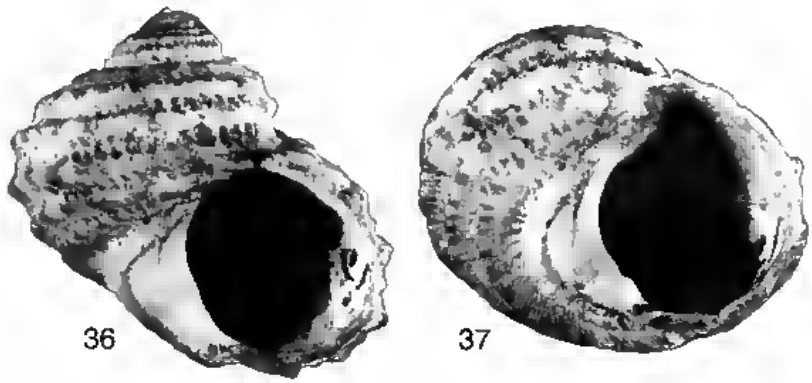
REMARKS

G. & H. NEVILL (1875) placed this name in the synonymy of *Tallorbis roseola* G. & H. Nevill, 1869, described from Ceylon, a proposal that was accepted by FISCHER (1879 *in* 1875-1880) and HEDLEY (1915). There are two syntypes of *T. roseola* in the ZSIC (M2258/1, R. N. Kilburn, pers. comm.), the larger of which is here illustrated (Fig. 76) and designated

Source : MNHN, Paris

lectotype. This specimen has a bolder colour pattern and more pronounced cancellation than the holotype of *T. lamberti*, but is in other respects very similar. Although it is perhaps unwise to assess synonymy with so little material available, I believe the apparent differences result primarily from the fresher condition of the *T. roseola* lectotype, and concur with earlier authors in considering there to be only one species involved.

The generic affinity of this species is unclear. The NEVILL brothers assigned the taxon to their new genus *Tallorbis* G. & H. Nevill, 1869, but this has subsequently been synonymised with *Euchelus* Philippi, 1847 (*e.g.* KEEN 1960). Certainly the taxon appears referable to the Chilodontini, but its relationships within this group require further study. HEDLEY (1915) regarded *Tallorbis* as an earlier name for *Hybochelus* Pilsbry, 1889.



FIGS 36-37. — *Trochus (Euchelus) lamberti* Souverbie *in* Souverbie & Montrouzier, 1875, holotype (diameter 9.0 mm, length 8.7 mm).

CONCLUSION

A synonym of *Tallorbis roseola* G. & H. Nevill, 1869 (Eucyclinae, Chilodontini), but generic affinity requires further study.

Trochus (Monilea) lifuanus Fischer, 1878
(Figs 38-40)

Trochus (Monilea) lifuanus Fischer, 1878a: 63; CERNOHORSKY 1978: 36. Type loc.: "ins. Lifu" [Lifou](Loyalty Islands, New Caledonia).

Monilea lifuana; SOUVERBIE & MONTROUZIER 1879: 30, pl. 3, fig. 5; FISCHER 1879 *in* 1875-1880: 388, pl. 116, fig. 4; PILSBRY 1889: 252, pl. 41, figs 6, 7, pl. 59, figs 64, 65; HEDLEY 1899: 405, 1909: 353.

Trochus (Monilea) lifuana; SMITH 1884: 73, pl. 6, figs B, B1.

Minolia lifouana [*sic*]; MELVILL & STANDEN 1895 *in* 1895-1897: 125.

Monilea (Monilea) lifuana; LADD 1966: 40, pl. 5, figs 13, 14.

Source : MNHN, Paris

TYPE MATERIAL. — A single specimen labelled "type décrit Journ. de Conch. t. 26, p. 63, et Souverbie t. 27, *Monilea lifuana* p. 30, pl. 3, f. 5. Île Lifou, *ex auctore*" is present in the MHNB (Figs 38-40). It may be regarded as the holotype (dimensions: diameter 13.6 mm, length 10.7 mm). There is no material in the MNHN.

REMARKS

IREDALE (1929) rightly compared his new species *Talopena gloriola*, from New South Wales, with *Trochus lifuanus*, and at the same time proposed that *lifuanus* be referred to *Talopena*. There can be little doubt that *lifuanus* and *gloriola* are congeneric since their conchological similarities are considerable. Whether in fact they are referable to *Talopena* Iredale, 1918, however, is less clear, since its type species, *Monilea incerta* Iredale, 1912, has strong spiral sculpture and is clearly nothing more than a small species of *Monilea* s. str. (*cf.* MARSHALL 1979). Greater similarity is shown with a cluster of species conchologically intermediate between *Ethalia* H. & A. Adams, 1854, and *Ethminolia* Iredale, 1924 (HERBERT 1992, figs 131-136). The present species differs from *Ethminolia* s. str. in being larger and in possessing a distinct umbilical funicle, and from *Ethalia* s. str. in that the shell is thin and the terminal funicular callus largely separate from the parietal region. It is impossible to reliably assign these intermediate taxa to genus using conchological characters alone. Resolution of the dilemma must await studies of the radula and anatomy.

FIGS 38-40. — *Trochus (Monilea) lifuanus* Fischer, 1878, holotype (diameter 13.6 mm, length 10.7 mm).

Source : MNHN, Paris

Whether or not *T. lifuanus* and *T. gloriola* represent distinct species also requires further study. Comparison of the type material (*cf.* HERBERT 1992, fig. 131) indicates *gloriola* to be somewhat taller and to have a slightly less well-developed callus (that is brownish rather than green) at the end of the umbilical funicle, but these differences are not great and might easily be encompassed within the variability of a single species. CERNOHORSKY (1978) and WILSON (1993) placed *T. lifuanus* in synonymy with *Monilea vernicosa* Gould, 1861, described from the Ryukyu Islands, but I consider this unlikely. The holotype of *M. vernicosa* (JOHNSON 1964, pl. 20, fig. 2; HERBERT 1992, fig. 136), though sculpturally indistinguishable from *T. lifuanus*, is slightly more depressed and has a much weaker umbilical funicle. It could be suggested that, with a diameter of only 5.3 mm, the *vernicosa* holotype is juvenile and thus could be expected to have a more weakly developed funicle, but specimens of *T. lifuanus* of a similar size already have a much more strongly developed funicle and, furthermore, have an altogether narrower umbilicus.

CONCLUSION

Probably a valid species and perhaps an earlier name for *Talopena gloriola* Iredale, 1929; somewhat intermediate between *Ethminolia* and *Ethalia* in shell characters (Umboniinae).

Trochus (Monilea) rhodomphalus Souverbie *in* Souverbie & Montrouzier, 1875
(Figs 41-43)

Trochus (Monilea) rhodomphalus Souverbie *in* Souverbie & Montrouzier, 1875: 36, pl. 4, fig. 3. Type loc.: "ins. Lifou" (Loyalty Is).
Trochus rhodomphalus; FISCHER 1878b: 210; 1879 *in* 1875-1880: 392, pl. 117, fig. 3.
Monilea rhodomphala; PILSBRY 1889: 262, pl. 41, figs 22-24.
Minolia rhodomphala; MELVILL & STANDEN 1897 *in* 1895-1897: 414.

TYPE MATERIAL. — The original description cites "Mus. Burdigalense" and mentions three specimens. Only two, bearing the label "types décrits Journ. de Conch. t. 23, p. 36, No. 1 celui figuré pl. 4, f. 3, No. 2 celui figuré dans Kiener et Fischer [= FISCHER 1879 *in* 1875-1880, pl. 117, fig. 3]. Île Lifou, *ex auctore*", are now present in the MHNB. The first of these is here refigured (Figs 41-43) and designated lectotype (dimensions: diameter 7.6 mm, length 5.0 mm). There is no material in the MNHN.

REMARKS

Similar to a number of taxa described from the central Indo-West Pacific. *Ethalia rhodomphala* Smith, 1903, from the Maldive and Laccadive archipelagos (three syntypes BMNH 1903.9.17.57-59, one here figured and designated lectotype, Figs 77-79), differs in having non-shouldered whorls and thus a more flat-sided spire; it also has a well-developed, linguiform callus deposit at the junction of the columella and parietal region, strong plicae at the umbilical margin and is more glossy. *Ethalia floccata* Sowerby, 1903, from Japan (holotype BMNH 1903.12.7.15), is perhaps the most similar species, but besides differences in coloration, the holotype of that taxon has more or less obsolete spiral sculpture and has a wider umbilicus with a less strongly thickened margin (Figs 80-82). *Isanda pulchella* A. Adams, 1855, from Mindoro,

Source : MNHN, Paris

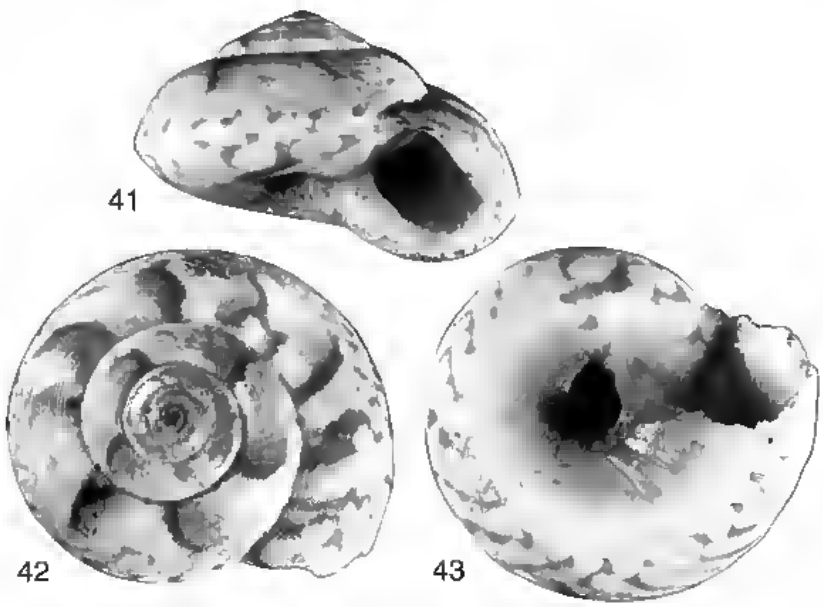
Philippines (holotype BMNH 1968350) and *Ethalia capillata* Gould, 1862, from China, are closer to *E. rhodomphala* Smith, 1903, but *I. pulchella* has a more funnel-shaped umbilicus with weaker marginal plicae (Figs 83-85), and *E. capillata* a larger linguiform callus that almost totally occludes the umbilicus (lectotype figured by JOHNSON 1964, pl. 5, fig. 14).

PILSBRY (1905) united these taxa (save for *E. capillata*) in his new genus *Ethaliella*, citing *E. floccata* as the type species. If conchological criteria alone are considered, there is perhaps justification for this, but additional data from the external anatomy and radula may prove otherwise. Whether these five nominal taxa represent distinct species is also open to question. *T. rhodomphalus* and *E. floccata* could easily represent variations of a single species, perhaps belonging in *Ethminolia* Iredale, 1924 or *Ethalia* H. & A. Adams, 1854. Similarly, *E. rhodomphala*, *E. capillata* and *I. pulchella* may be another single species. However, in the absence of adequate series of specimens and data on external anatomy and radula, it is worthless to speculate further on this. Three additional taxa, *Minolia ceraunia*, *M. edithae* and *M. malcolmia*, described by MELVILL (1891) from the Philippines also merit comparison with this group of species.

FISCHER (1878b) indicated that he believed *Trochus rotellaeformis* Philippi, 1849, of unknown provenance, to be a synonym of *T. rhodomphalus*. PHILIPPI stated that the original material was in the collection of Silvanus Hanley, but it could not be traced at the Leeds Museum (NORRIS *in lit.*) and thus I cannot confirm the synonymy.

CONCLUSION

A member of the *Ethaliella* group of species (Umboniinae) and probably an earlier name for *Ethalia floccata* Sowerby, 1903.



FIGS 41-43. — *Trochus (Monilea) rhodomphalus* Souverbie *in* Souverbie & Montrouzier, 1875, specimen figured with original description and here designated lectotype (diameter 7.6 mm, length 5.0 mm).

Source : MNHN, Paris

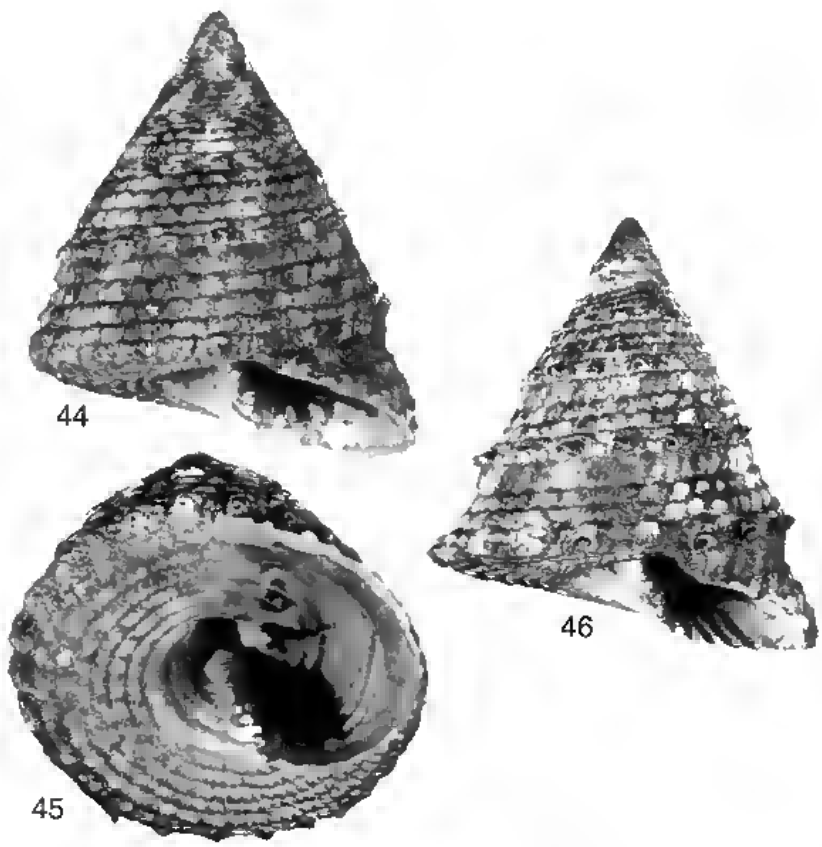
Trochus (Polydonta) calcaratus Souverbie *in* Souverbie & Montrouzier, 1875
(Figs 44-46)

Trochus (Polydonta) calcaratus Souverbie *in* Souverbie & Montrouzier, 1875: 41, pl. 4, figs 7, 7a. Type loc.: "ins. Art" (New Caledonia).

Trochus calcaratus; FISCHER 1875: 48; 1879 *in* 1875-1880: 347, pl. 109, fig. 2; PILSBRY 1889: 30, pl. 2, fig. 15, pl. 8, figs 83, 84; HIDALGO 1904-1905: 246; HEDLEY 1909: 353; KAICHER 1979: 2174.

Infundibulum (Lamprostoma) calcaratum; DAUTZENBERG & BOUGE 1933: 405.

TYPE MATERIAL. — The original description stated that twelve examples had been seen; only two, labelled "types! décrits Journ. de Conch. t. 23, p. 41, et figurés pl. 4, f. 7 & 7a. Île Art, *ex auctore*!", are present in the MHNB. There are none in the MNHN. Although one of the specimens is labelled 7a, the original plate did not distinguish fig. 7 from fig. 7a. Because specimen 7a (Figs 44-45) has more mature apertural and umbilical features, I designate it lectotype (dimensions: diameter 23 mm, length 28 mm).



FIGS 44-46. — *Trochus (Polydonta) calcaratus* Souverbie *in* Souverbie & Montrouzier, 1875. 44-45, lectotype (diameter 23 mm, length 28 mm); 46, paralectotype (diameter 21 mm, length 23 mm).

Source : MNHN, Paris

REMARKS

PILSBRY (1889), with some reservations, relegated a number of taxa to the synonymy of *T. calcaratus*, some of which in fact pre-date it. More recently, CERNOHORSKY (1978) and WILSON (1993) placed *T. calcaratus* in synonymy with *T. histrio* Reeve, 1861 (apparent syntype in BMNH illustrated by KAICHER 1979, under *T. sacellum,* card No. 2169). Our current understanding of the taxonomy of the genus *Trochus*, however, is woefully inadequate. Numerous species of *Trochus* were described during the last century, many of which simply represent individual variants of intraspecifically variable species. The situation is complicated further by the fact that descriptions and illustrations were often poor and that the type material of many is now lost. Although the synonymy proposed by CERNOHORSKY may be sound, it needs to be investigated in detail. It remains quite possible that there is a still earlier name for the species (for example *Trochus sacellum* Philippi, 1855).

Both remaining specimens in the type lot of *T. calcaratus* are here illustrated (Figs 44-46) to show the variation in the development of the peripheral angle and projections. The species is relatively small for the genus, showing mature apertural characters at length 30 mm; one of its most notable features is the series of hollow triangular projections at the periphery, but this is not a unique character (cf. *Trochus aemulans* (A. Adams, 1855) from China and *T. tubiferus* Kiener, 1850, from New Caledonia). The specimens are white to pale buff, with broad reddish axial markings.

CONCLUSION

One of the many dubiously valid species of *Trochus* s. str. (Trochinae, Trochini); in need of detailed comparison.

Trochus (Tectus) fabrei Montrouzier *in* Fischer, 1878
(Figs 47-48)

Trochus (Tectus) fabrei Montrouzier *in* Fischer, 1878a: 64; FISCHER 1879 *in* 1875-1880: 384, pl. 116, figs 1, 1a. Type loc.: "ins. Lifu" [Lifou] (Loyalty Islands, New Caledonia).
Trochus fabrei; PILSBRY 1889: 21, pl. 3, figs 21, 22.

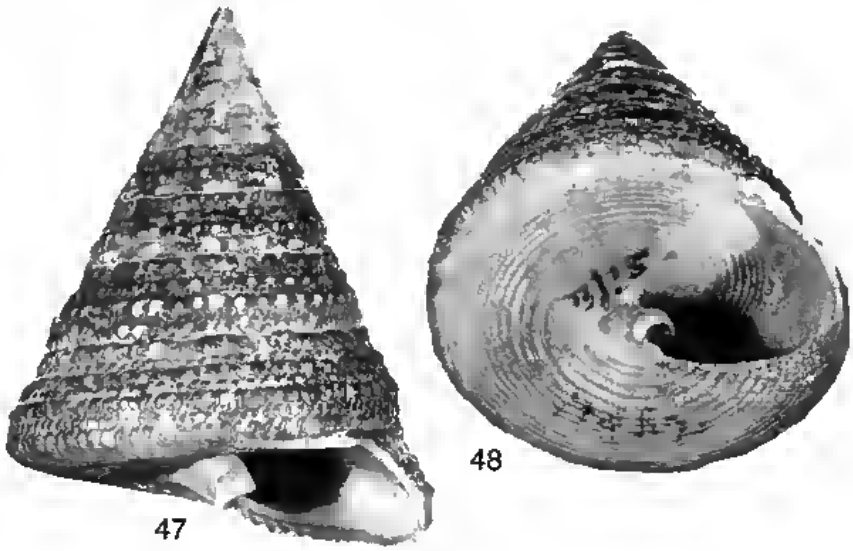
TYPE MATERIAL. — Two specimens are present in the MHNB; one (leg. Montrouzier) from "Lifu" [Lifou] and a second (leg. Lambert), a fossil from raised beach deposits on the île des Pins (both localities in the New Caledonian archipelago). They bear the label "J. Conch. t. 26: 64 & 206". No figure was provided with the original description (FISCHER 1878a), the first illustrations being those given in the "*Spécies général*" (FISCHER 1879 *in* 1875-1880). Both specimens were illustrated, the Lifou one as fig. 1a, and the larger, fossil one as fig. 1. The Lifou specimen is here refigured (Figs 47-48) and designated lectotype (dimensions: diameter 26.5 mm, length 34.3 mm).

REMARKS

This material is indeed referable to *Tectus* Montfort, 1810, a taxon currently afforded full generic rank. The strong columella pleat suggests referral to *Tectus* s. str.

Source : MNHN, Paris

FISCHER's remarks on the species are pertinent (FISCHER 1879 *in* 1875-1880). There is considerable similarity with *Tectus triserialis* (Lamarck, 1822), but *T. fabrei* would seem to be less elevated and to have a sculpture of granular spiral cords rather than the spirally aligned rows of nodules typical of *T. triserialis*. However, the extent to which *T. triserialis* varies in length and sculpture needs to be further investigated. *T. pyramis* (Born, 1778) is less elevated, generally more coeloconoid and, with the exception of strong peripheral granules on the spire whorls, is smoother.



FIGS 47-48. — *Trochus (Tectus) fabrei* Montrouzier *in* Fischer, 1878, lectotype (diameter 26.5 mm, length 34.3 mm).

CONCLUSION

A species of *Tectus* s. str. (Trochinae, Trochini); further comparison with *T. triserialis* (Lamarck, 1822) is needed.

Trochus (Zizyphinus) poupineli Montrouzier *in* Souverbie & Montrouzier, 1875
(Figs 49-50)

Trochus (Zizyphinus) poupineli Montrouzier *in* Souverbie & Montrouzier, 1875: 40, pl. 4, fig. 6; FISCHER 1878b: 210; 1879 *in* 1875-1880: 387, pl. 116, fig. 3. Type loc.: "ins. Art" (New Caledonia).

Calliostoma poupineli; PILSBRY 1889: 350, pl. 17, fig. 41.

Dactylastele poupineli; MARSHALL 1995, figs 79-82, 135, 155.

Source : MNHN, Paris

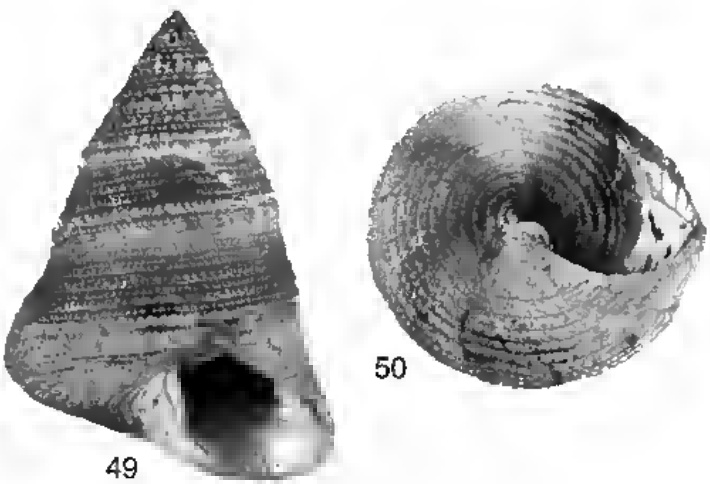
TYPE MATERIAL. — The single specimen mentioned in the original description remains in the MHNB, it must be regarded as the holotype (Figs 49-50) (dimensions: diameter 8.4 mm, length 11.7 mm). It is labelled "type décrit Journ. de Conch. et figuré dans Kien. t. 23, p. 40, pl. 4, f. 6 [= figure in *J. Conch. Paris*]. Île Art, *ex auctore*". There are two "*ex* auteur" specimens in the MNHN.

REMARKS

Frequently regarded a synonym of *Ziziphinus comptus* A. Adams, 1854, and used in place of that name to avoid confusion with *Calliostoma comtus* (Philippi, 1855) (see for example PILSBRY 1889). The species has recently been discussed in detail by MARSHALL (1995) who recognised it as distinct from *Calliostoma comptum*, and referred it to the new genus *Dactylastele*.

CONCLUSION

A valid species (Calliostomatidae).



FIGS 49-50. — *Trochus (Zizyphinus) poupinelii* Montrouzier *in* Souverbie & Montrouzier, 1875, holotype (diameter 8.4 mm, length 11.7 mm).

Turbo artensis Montrouzier *in* Souverbie, 1860
(Fig. 51)

Turbo artensis Montrouzier *in* Souverbie, 1860b: 370; SOUVERBIE 1861: 274, pl. 11, fig. 5; FISCHER 1873: 58, pl. 37, fig. 1, pl. 38, fig. 1; PILSBRY 1888: 196, pl. 45, figs 96-97; FISCHER-PIETTE 1950: 19; KAICHER 1988: 5291. Type loc.: "ins. Art" (New Caledonia).

Turbo (Senectus) artensis; MELVILL & STANDEN 1895 *in* 1895-1897: 124.

Turbo (Marmorastoma) artensis; CERNOHORSKY 1978: 39, pl. 10, fig. 3.

TYPE MATERIAL. — The original description did not specify the number of specimens available, but SOUVERBIE (1861) stated that numerous examples had been seen. Two specimens are present in the MHNB, labelled "No. 1 et 2, types décrits Journ. de Conch. t. 8, p. 370 et t. 9, p. 274, No. 1 type figuré pl. 11, fig. 5. Île Art, don de l'auteur". Two further lots, labelled as types, are present in the MNHN. One of these, in the typothèque, contains four adult specimens and three juveniles; one of the adults bears a note stating "un des exemplaires ayant servi

Source : MNHN, Paris

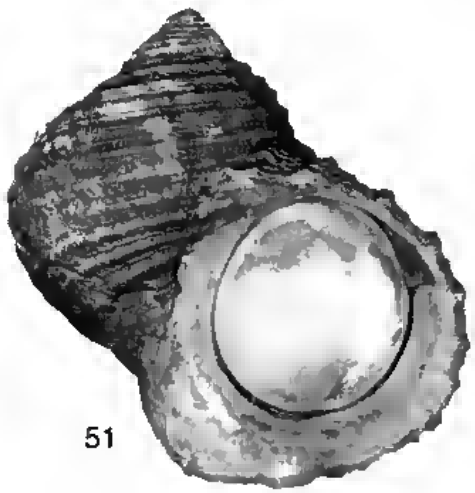
à la diagnose. Ex auctore !". The second lot, in the *Journal de Conchyliologie* collection, has two specimens which were listed as types by FISCHER-PIETTE (1950: 19), the larger of these he also cited as the figured specimen. There is, however, nothing associated with this specimen to indicate that this was the case (normally in the *Journal de Conchyliologie* collection there would be, V. HEROS *in lit.*) and in view of the fact that the MHNB specimen No.1 is specifically annotated as being the figured one I designate it as lectotype (here refigured, Fig. 51) (dimensions: diameter 44.5 mm, length 47 mm). This is also the course of action advised by Recommendation 74D of the ICZN, since the majority of the author's types are in Bordeaux. The other MHNB specimen and the MNHN specimen cited as being one of those upon which the diagnosis was based should be considered paralectotypes, but the type status of the remainder is dubious.

REMARKS

This would seem to be a fairly distinct species characterised by shape and sculpture. It has relatively strong spiral cords, the intervals between which have a single finer spiral thread which is crossed by >-shaped axial pliculae producing a close-set, herring-bone sculpture. There is no umbilicus and the peristome is markedly drawn out and flaring where the columella and outer lip meet. The ground colour is orange-brown (perhaps somewhat faded) with a few darker and lighter axial stripes. The operculum is for the most part smooth, but possesses some rippling on the outer lip side; the markings shown in Fig. 51 are a result of discoloration.

CONCLUSION

A valid species of *Turbo* (Turbinidae, Turbininae).



51

FIG. 51. — *Turbo artensis* Montrouzier *in* Souverbie, 1860, specimen figured with original description and here designated lectotype (diameter 44.5 mm, length 47.0 mm).

Turbo laetus Montrouzier *in* Souverbie & Montrouzier, 1863
(Figs 52-54)

Turbo laetus Montrouzier *in* Souverbie & Montrouzier, 1863b: 277, pl. 12, fig. 2. Type loc.: "Balade et ins. Art" (New Caledonia).

Source : MNHN, Paris

Leptothyra laeta; PILSBRY 1888: 258, pl. 63, figs 29, 30; HEDLEY 1899: 408, 1907: 479, 1909: 355; SHOPLAND 1902: 176; HIDALGO 1904-1905: 245; MELVILL 1918: 152; IREDALE 1929: 273; VIADER 1937: 55.

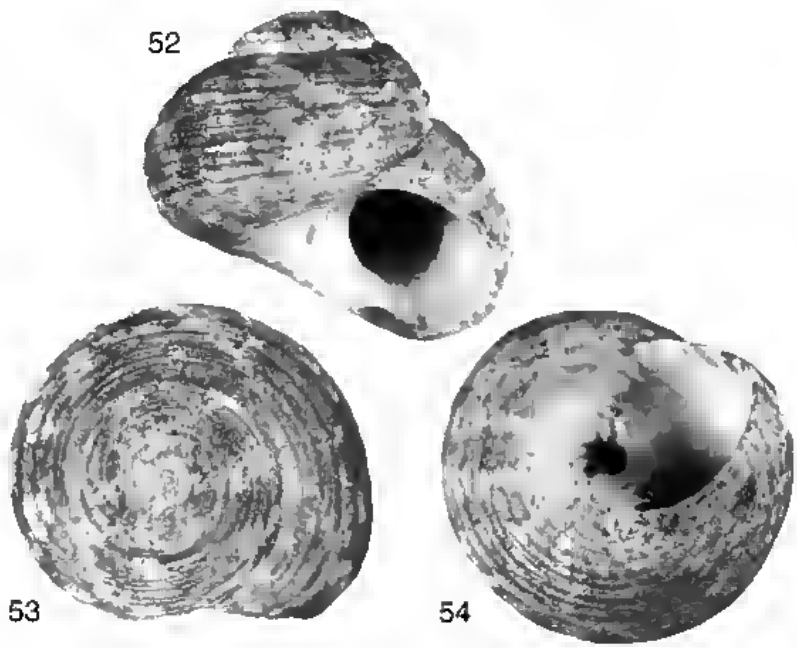
TYPE MATERIAL. — There are four syntypes in the MHNB, labelled "Types décrits Journ. de Conch. No. 1 celui figuré, pl. 4 [*sic*], f. 2. Île Art. don. de l'auteur". No. 1 is here refigured (Figs 52-54) and designated lectotype (diameter 5.0 mm). There are a further eleven specimens labelled as syntypes in the MNHN and four specimens "ex auteur". The original description stated that there were twenty-five specimens.

REMARKS

This name is a junior primary homonym of *Turbo laetus* Philippi, 1849. SOWERBY (1886) proposed the replacement name *costulosus*, an adaptation of "*Turbo costulatus* Gould" (ms?) (non Wood, 1828). This is one of numerous species of *Collonista* Iredale, 1918, described from the Indo-West Pacific. J. H. MCLEAN, who is currently revising the Colloniinae, has indicated (MCLEAN *in lit.*) that the earliest non-homonymous name for this taxon is *Collonia granulosa* Pease, 1868, based on material from the Caroline Islands. A lectotype for the latter was designated and figured by JOHNSON (1994), but the figure number was inadvertently transposed with that of *C. picta* Pease, 1868. JOHNSON's fig. 21 is in fact that of the lectotype of *C. granulosa* (error noted by MCLEAN).

CONCLUSION

A junior primary homonym, the earliest available name for which is *Collonia granulosa* Pease, 1868 (*fide* MCLEAN *in lit.*); should be referred to *Collonista* Iredale, 1918 (Turbinidae, Colloniinae).



FIGS 52-54. — *Turbo laetus* Montrouzier *in* Souverbie & Montrouzier, 1863, specimen figured with original description and here designated lectotype (diameter 5.0 mm).

Source : MNHN, Paris

Turbo naninus Souverbie *in* Souverbie & Montrouzier, 1864
(Figs 55-58)

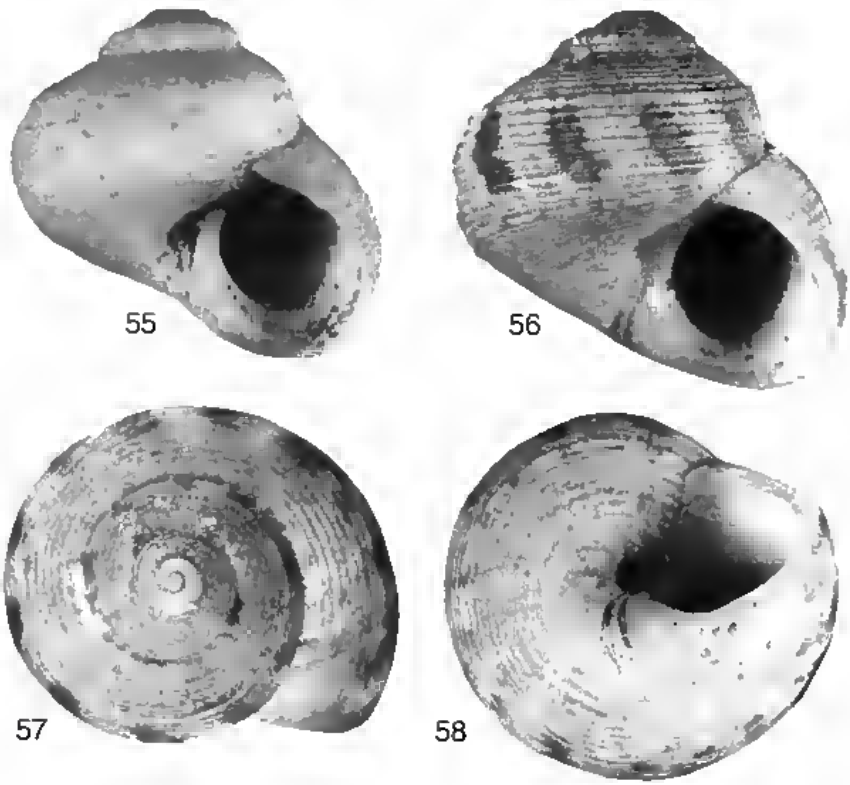
Turbo naninus Souverbie, *in* Souverbie & Montrouzier, 1864: 263, pl. 10, fig. 6; SOUVERBIE 1875: 293, pl. 13, fig. 9. Type loc.: "ins. Art" (New Caledonia).

Leptothyra nanina; PILSBRY 1888: 259, pl. 58, figs 55, 56; HEDLEY 1907: 479; 1909: 355; CERNOHORSKY 1978: 39, pl. 10, fig. 5.

TYPE MATERIAL. — There are two separate type lots of this species in the MHNB, each with one specimen. The first is labelled "types décrits et figurés Journ. de Conch. t. 12, p. 235 [*sic*], pl. 11 [*sic*], fig. 6 (Mala.). Île Art, don de l'auteur", whilst the label attached to the second states "Journ. de Conch. t. 12, p. 243 [*sic*], pl. 10, fig. 6 (Mala.) in ibid., t. 23, p. 293, pl. 13, fig. 9. Type *characteribus emendatis, ex auteur.*" The original description stated that only a single specimen was available and thus the specimen in the first lot, upon which the original description and figure were based, must be regarded as the holotype (Fig. 55, diameter 3.0 mm), despite the fact that SOUVERBIE (1875) considered it "un peu imparfait". The specimen in the second lot (*cf.* Figs 56-58) is simply a fresher example that SOUVERBIE (1875) used to augment the description, but it has no type status. There are two further specimens labelled syntypes in the MNHN; these are *ex auctore* specimens, but they likewise have no status as types.

REMARKS

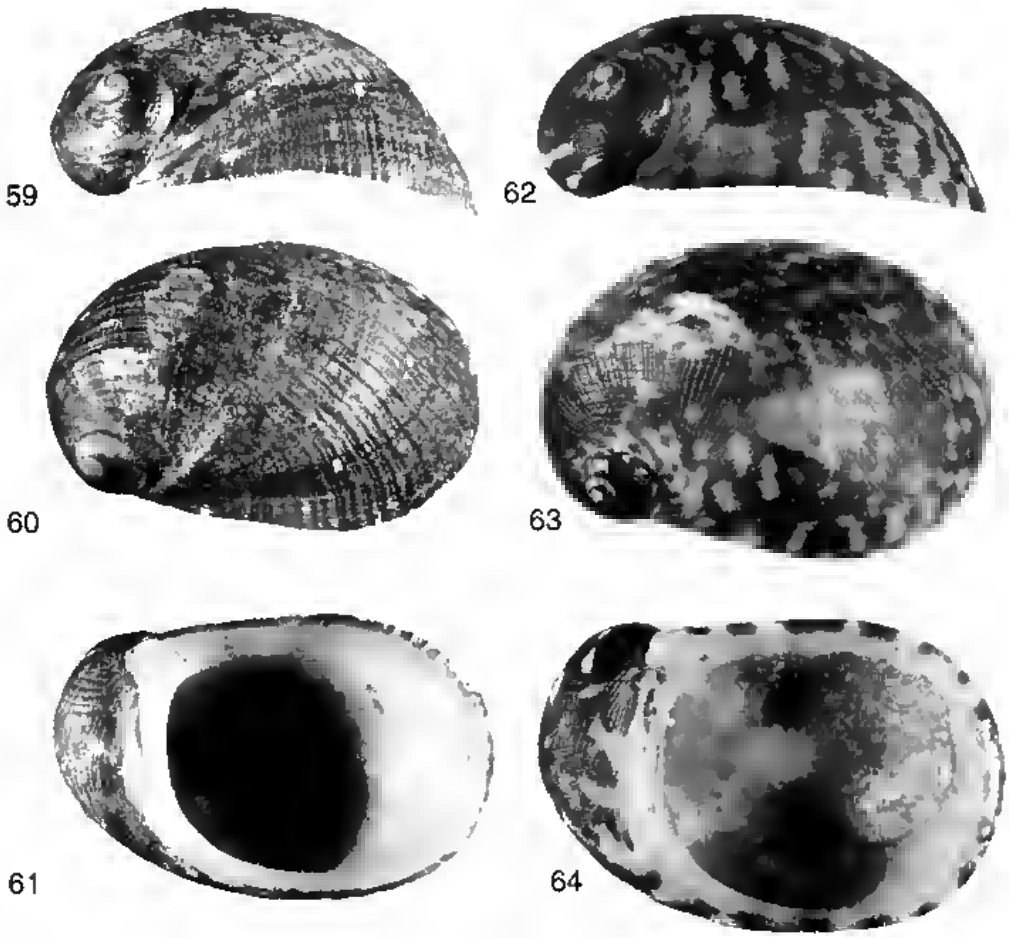
Resembles the preceding species, but the last adult whorl is somewhat biangular with a distinct angle at the shoulder and a weaker one marking the periphery of the base. The sculpture



FIGS 55-58. — *Turbo naninus* Souverbie *in* Souverbie & Montrouzier, 1864. 55, holotype (diameter 3.0 mm); 56-58, fresher, *characteribus emendatis* specimen of Souverbie (1875) (diameter 3.0 mm)

Source : MNHN, Paris

is finer and, judging from the material available, the species would seem to be smaller. This taxon also belongs within *Collonista* and is being studied by J. H. McLEAN, who indicated (*in lit.*) that it may prove to be a New Caledonian endemic.

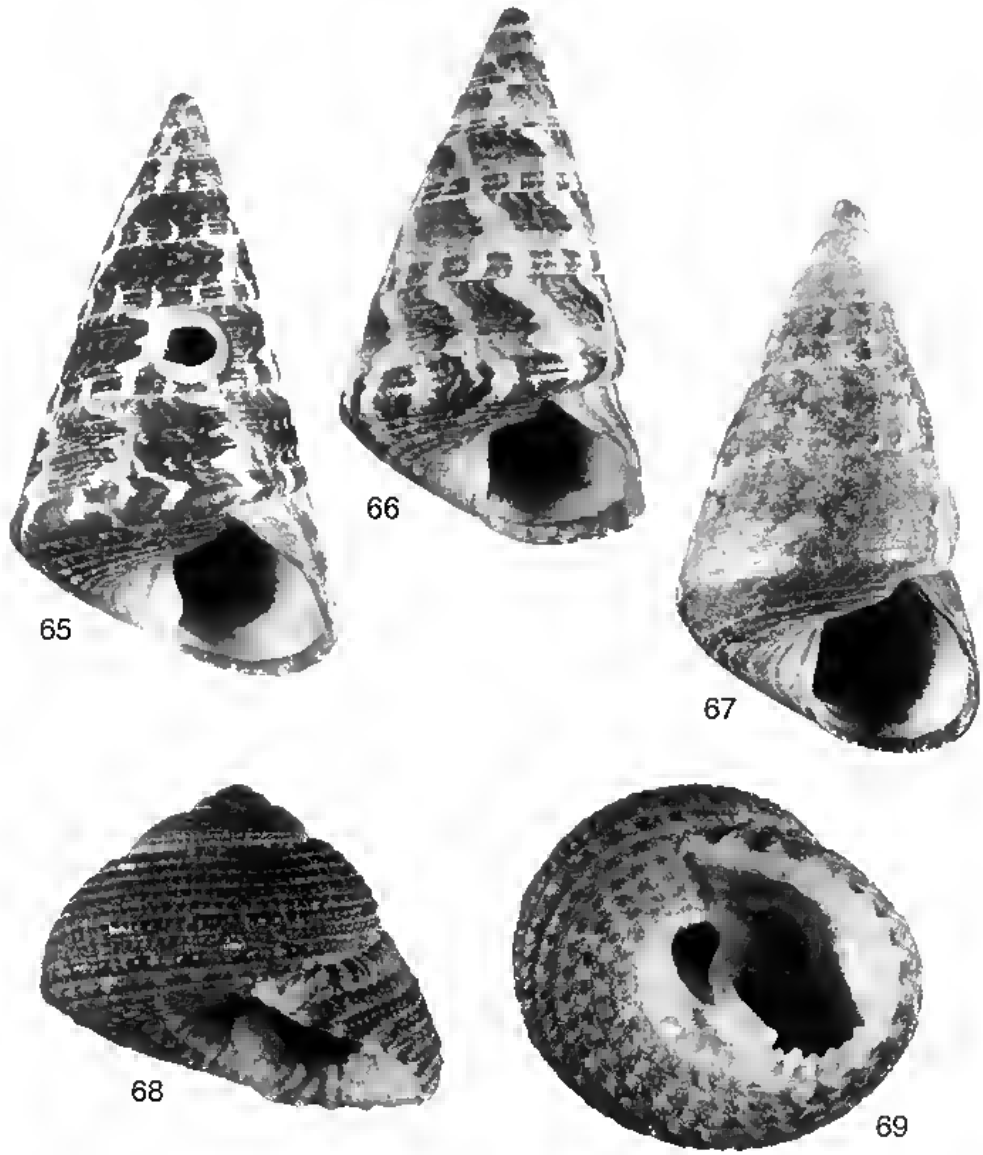


FIGS 59-64. — *Stomatella caliginosa* H. & A. Adams, 1864 and *Stomatella ornata* Brazier, 1877. 59-61, *S. caliginosa*, holotype (BMNH), length 7.9 mm; 62-64, *S. ornata*, one of four syntypes in AMS, (length 7.5 mm).

Acknowledgements

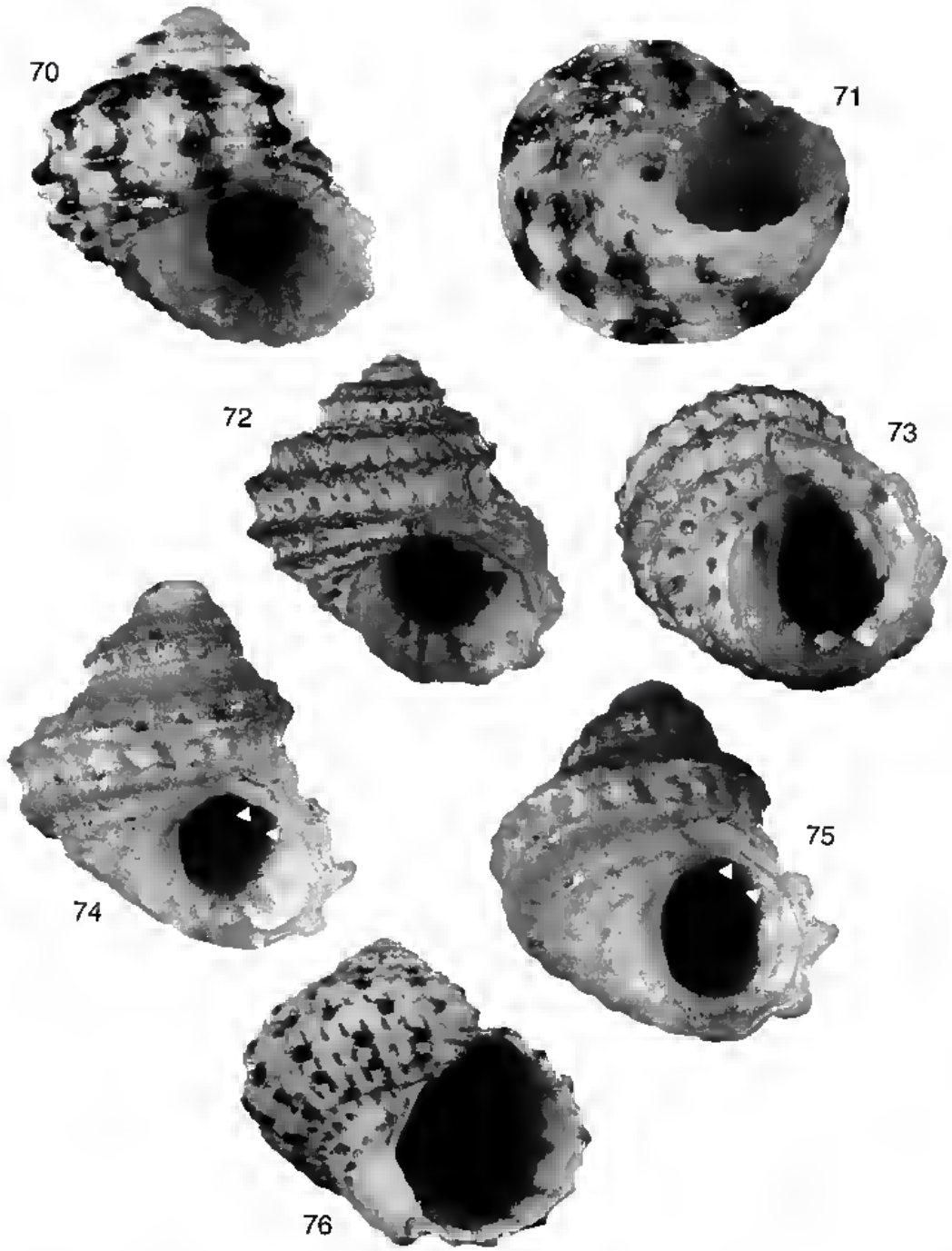
I would like to thank the authorities of the MHNB for permission to examine the New Caledonian types in their custody, and in particular Mme Nathalie MEMOIRE without whose assistance this study would not have been possible. I thank also Bernard MÉTIVIER (MNHN) and Kathie WAY (BMNH) for their help whilst examining types under their care, Ian LOCH (AMS) for the loan of Brazier types, Gary ROSENBERG (ANSP) for Pease types and Dick KILBURN for photographs of types in the Zoological Survey of India. Philippe BOUCHET, Dick KILBURN, Bruce MARSHALL and Jim MCLEAN provided valuable comments on the manuscript and Virginie HEROS checked the accuracy of my statements regarding the MNHN types. The study was funded through my personal Foundation for Research Development grant.

Source : MNHN, Paris



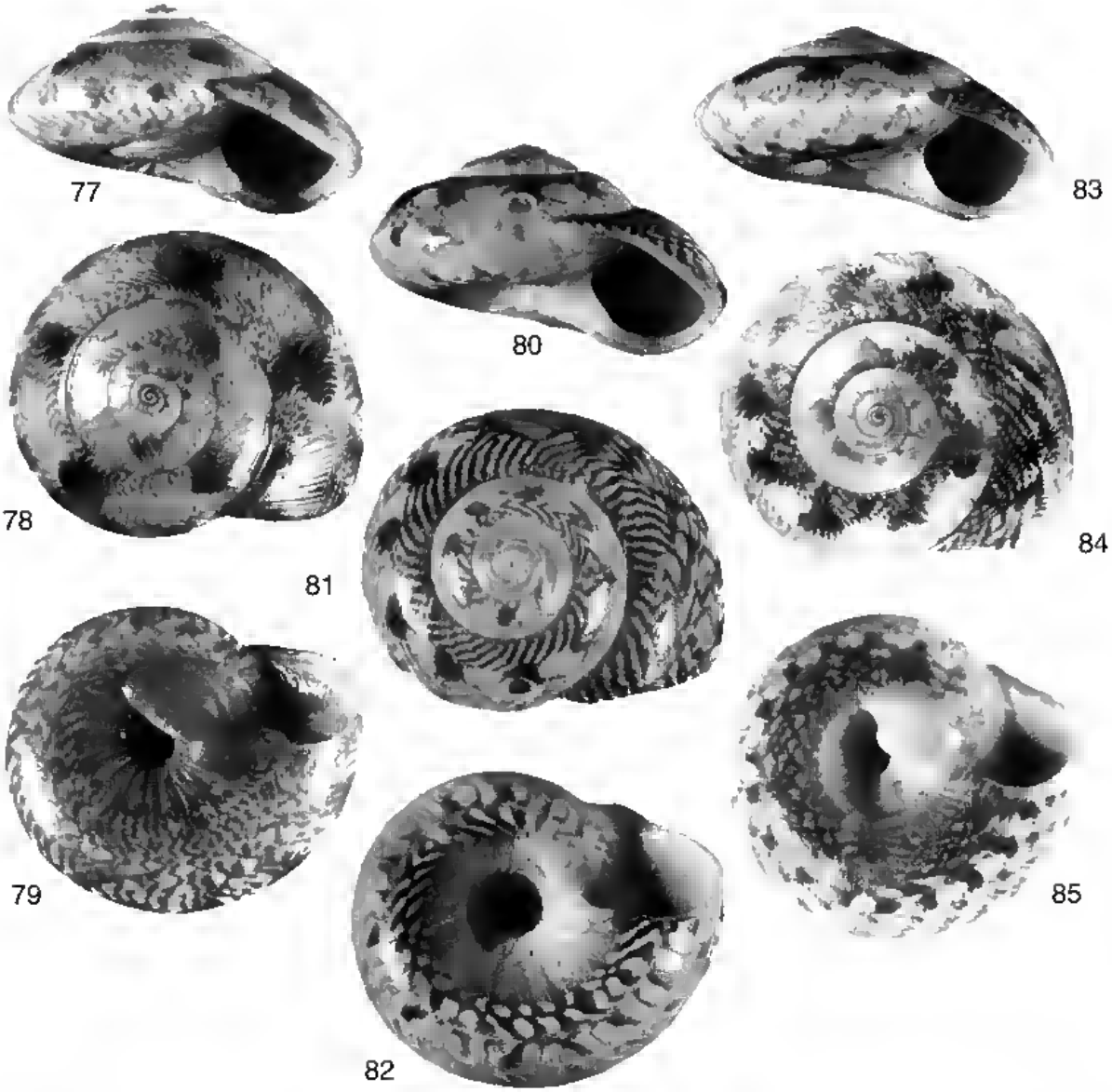
FIGS 65-69. — *Zeziphinus polychromus* A. Adams, 1853, *Zeziphinus picturatus* A. Adams, 1853, *Trochus fournieri* Crosse, 1863 and *Trochus (Clanculus) bathyraphe* Smith, 1876. 65, *Z. polychromus*, lectotype (BMNH), length 12.3 mm; 66, *Z. picturatus*, lectotype (BMNH), length 11.5 mm; 67, *T. fournieri*, holotype (BMNH), length 7.9 mm; 68-69, *T. bathyraphe*, one of two syntypes (BMNH), diameter 8.3 mm.

Source : MNHN, Paris



FIGS 70-76. — *Turbo semilugubris* Deshayes, 1863, *Monodonta foveolata* A. Adams, 1853, *Euchelus angulatus* Pease, 1868, and *Tallorbis roseola* G & H Nevill, 1869. 70-71, *T. semilugubris*, one of two syntypes (MNHN), diameter 2.66 mm; 72-73, *M. foveolata*, lectotype (BMNH), diameter 5.2 mm; 74-75, *E. angulatus* Pease, 1868, lectotype (ANSP 40671), diameter 4.6 mm, denticles inside outer lip present, but not obvious (arrows); 76, *T. roseola*, lectotype (ZSIC), drameter 9.1 mm (photograph courtesy of R. N. Kilburn).

Source : MNHN, Paris



FIGS 77-85. — *Ethalia rhadomphala* Smith, 1903, *Ethalia floccata* Sowerby, 1903 and *Isanda pulchella* A. Adams, 1855. 77-79, *E. rhodomphala*, lectotype (BMNH), diameter 6.9 mm; 80-82, *E. floccata*, holotype (BMNH), diameter 7.9 mm; 83-85, *I. pulchella*, holotype (BMNH), diameter 7.5 mm.

Source : MNHN, Paris

REFERENCES

ABBOTT R. T., 1958. — The marine mollusks of Grand Cayman Island, British West Indies. *Monogr. Acad. nat. Sci. Philad.* **11**, 138 p., plus plates and index.

ADAM W. & LELOUP E., 1938. — Résultats scientifiques du voyage aux Indes Orientales Néederlandaises. *Mém. Mus. r. Hist. nat. Belg.* **2** (19) : 1-209.

ANONYMOUS, 1985. — *International Code of Zoological Nomenclature*, third edition. London, International Trust for zoological Nomenclature, 338 p.

CERNOHORSKY W. O., 1978. — *Tropical Pacific marine shells*. Sydney: Pacific Publications.

CROSSE H., 1898. — Nécrologie – le R. P. Xavier Montrouzier. *J. Conch.*, Paris **46** : 42-44.

DAUTZENBERG P. & BOUGE J-L., 1933. — Les mollusques testacés marins des établissements français de l'Océanie. *J. Conch.*, Paris **33** : 41-108, 145-326, 351-469.

FISCHER H., 1904. — Nécrologie – le R. P. Lambert. *J. Conch.*, Paris **52** : 99-100.

FISCHER P., 1873. — Genre *Turbo*. *In* L. C. KIENER (ed.) *Spécies général et iconographie des coquilles vivantes*. Paris, J.-B. Baillère et fils **10** : 1-128, pls 1-42.

— 1875. — Catalogue des mollusques appartenant aux genres *Turbo*, *Calcar* et *Trochus*, recueillis dans les mers de l'archipel calédonien. *J. Conch.*, Paris **23** : 44-51.

— 1875-1880. — Genres *Calcar*, *Trochus*, *Xenophora*, *Tectarius* et *Risella*. *In* L. C. KIENER (ed.) *Spécies général et iconographie des coquilles vivantes*. Paris, J.-B. Baillère et fils **11**.

— 1876. — Remarques sur la synonymie et l'habitat de quelques espèces de mollusques de la Nouvelle-Calédonie. *J. Conch.*, Paris **24** : 148-151.

— 1878a. — Diagnoses trochorum novorum. *J. Conch.*, Paris **26**: 62-67.

— 1878b. — Catalogue des mollusques appartenant aux genres *Turbo*, *Calcar* et *Trochus*, recueillis dans les mers de l'archipel calédonien (Supplément), suivi de la liste des espèces des genres *Delphinula*, *Liotia* et *Phasianella*. *J. Conch.*, Paris **26** : 205-211.

— 1878c. — Diagnoses molluscorum novorum. *J. Conch.*, Paris **26**: 211-213.

FISCHER-PIETTE E., 1950. — Liste des types décrits dans le *Journal de Conchyliologie* et conservés dans la collection de ce journal. *J. Conch.*, Paris **90** : 8-22, 65-81, 149-179.

FRANC A., 1956. — Mollusques marins. *In* Campagne de la *Calypso* en Mer Rouge. *Annls Inst. océanogr.*, Monaco **32**: 19-60.

HEDLEY C., 1899. — The Mollusca of Funafuti. Part 1. – Gasteropoda. *Mem. Aust. Mus.* **3** (7): 397-488.

— 1901. — A revision of the types of the marine shells of the Chevert Expedition. *Rec. Aust. Mus* **4**: 121-130.

— 1907. — The Mollusca of Mast Head Reef, Capricorn group, Queensland. Part 2. *Proc. Linn. Soc.* N.S.W. **32**: 476-513.

— 1908. — Studies on Australian Mollusca. Part X. *Proc. Linn. Soc.* N.S.W. **33**: 456-489.

— 1909. — Catalogue of the marine Mollusca of Queensland. *Rep. Australas. Ass. Advmt Sci.* **12**: 343-371.

— 1915. — Studies on Australian Mollusca. Part XII. *Prac. Linn. Soc.* N.S.W **39**: 695-755, dated 1914.

HERBERT D. G., 1992. — Revision of the Umboniinae in southern Africa and Mozambique (Mollusca: Gastropoda: Trochidae). *Ann. Natal Mus.* **33** (2): 379-459.

— (in prep). — A revision of the Eucyclinae, tribe Chilodontini (Gastropoda: Trochidae) of southern Africa.

HIDALGO J. G., 1904-1905. — *Catalogo de los moluscos testáceos de las islas Filipinas, Jalá y Marianas. I. Moluscos marinos*. Madrid: Real Academia de Ciencias Exactas, Fiscias y Naturales.

HICKMAN C. S. & MCLEAN J. H., 1990. — Systematic revision and suprageneric classification of trochacean gastropods. *Science series, Natural History Museum of Los Angeles County* **35**: 1-169.

IREDALE T., 1929. — Queensland molluscan notes 1. *Mem. Qd Mus.* **9**: 261-297.

JANSEN P., 1994. — Notes on Australian species of *Euchelus* and *Herpetopoma* (Gastropoda: Trochidae) with description of five new species. *Molluscan Research* **15**: 55-66.

JOHNSON R. I., 1964. — *The Recent Mollusca of Augustus Addison Gould*. Washington, Smithsonian Institution.

— 1994. — Types of shelled Indo-Pacific mollusks described by W. H. Pease. *Bull. Mus. comp. Zool. Harv.* **154** (1): 1-61.

Source : MNHN, Paris

KAICHER S. D., 1979. — *Card catalogue of world shells.* Pack No. 21, Trochidae I. St Petersburg, Florida, Kaicher.

— 1988. — *Card catalogue of world shells.* Pack No. 52, Turbinidae I. St Petersburg, Florida, Kaicher.

— 1990. — *Card Catalogue of world shells.* Pack No. 56, Trochidae V. St Petersburg, Florida, Kaicher.

KEEN A. M., 1960. — *In* R. C. MOORE (ed.). *Treatise on Invertebrate Paleontology. Part I. Mollusca* **1**. Boulder, Colorado, Geological Society of America and University of Kansas.

LADD H. S., 1966. — Chitons and gastropods (Haliotidae through Adeorbidae) from the western Pacific islands. *Prof. Pap. U. S. Geol. Surv.* **531**: 1-98, pls 1-16.

LAMBERT. P., 1874. — Description d'un *Stomatella* provenant de la Nouvelle-Calédonie. *J. Conch.*, Paris **22** : 374.

MARSHALL B. A., 1979. — The Trochidae and Turbinidae of the Kermadec Ridge (Mollusca: Gastropoda). *N. Z. J. Zool.* **6** (4): 521-552.

— 1995. — Calliostomatidae (Mollusca: Gastropoda: Trochoidea) from New Caledonia, the Loyalty Islands and the northern Lord Howe Rise. *In* P. BOUCHET (ed.). *Résultats des Campagnes MUSORSTOM.* Vol. 14. *Mém. Mus. natn. Hist. nat.* **167** : 381-458.

MASTALLER M., 1979. — *Beiträge zur faunistik und ökologie der Mollusken und Echinodermen in der Korallenriffen bei Aquaba, Rotes Meer.* Ph. D. Thesis, Munich.

MELVILL J. C., 1891. — Descriptions of eleven new species belonging to the genera *Columbarium*, *Pisania*, *Minolia*, *Liotia*, and *Solarium*. *J. Conch.*, London **6**: 405-411.

— 1918. — Descriptions of thirty-four new species of marine Mollusca from the Persian Gulf, Gulf of Oman, and Arabian Sea, collected by Mr F. W. Townsend. *Ann. Mag. nat. Hist.* ser. 9 **1**: 137-158.

MELVILL J. C. & STANDEN R., 1895-1897. — Notes on a collection of shells from Lifu and Uvea, Loyalty Islands, formed by the Rev. James and Mrs Hadfield, with a list of species. *J. Conch.*, London **8**: part 1, 1895-1896: 84-132; part 2, 1896: 273-315, 1897: 379-381; part 3, 1897: 396-421.

— 1901. — The Mollusca of the Persian Gulf, Gulf of Oman and Arabian Sea, as evidenced mainly through the collections of Mr F. W. Townsend, 1893-1900; with descriptions of new species. *Proc. zool. Soc. Lond.*, 1901 **2**: 327-460.

NEVILL G. & NEVILL H., 1875. — Descriptions of new marine Mollusca from the Indian Ocean. *J. Asiatic Soc. Beng.* **44**: 83-104, pls vii-viii.

O'REILLY P., 1931. — Un missionnaire naturaliste – Xavier Montrouzier (1820-1897) [including bibliography]. *Rev. Hist. Missions*, March 1931: 1-23.

PILSBRY H. A., 1888. — Turbinidae. *In* G. W. TRYON (ed.). *Manual of Conchology*, Philadelphia, Academy of Natural Sciences. **10**: 161-290, pls 37-64.

— 1889. — Trochidae. *In* G. W. TRYON (ed.). *Manual of Conchology*, Philadelphia, Academy of Natural Sciences. **11**: 1-519, pls 167.

— 1890. — Stomatellidae, Scissurellidae, Pleurotomariidae, Haliotidae, Scutellinidae, Addisoniidae, Cocculinidae, Fissurellidae. *In* G. W. TRYON (ed.). *Manual of Conchology*, Philadelphia, Academy of Natural Sciences. **12**: 1-323, pls 164.

— 1904. — New Japanese Mollusca: Gastropoda. *Proc. Acad. nat. Sci. Philad.* **56**: 3-37.

— 1905. — New Japanese Mollusca. *Proc. Acad. nat. Sci. Philad.* **57**: 101-122.

PONDER W. F., 1978. — The unfigured Mollusca of J. Thiele, 1930 published in *Die Fauna Südwest-Australiens*. *Rec. W. Aust. Mus.* **6** (4): 423-441.

ROSEWATER J., 1972. — The family Littorinidae in the Indo-Pacific. Part II. The subfamilies Tectariinae and Echininae. *Indo-Pacific Mollusca* **2** (12): 507-533.

SCHEPMAN M. M., 1908. — The Prosobranchia of the *Siboga* Expedition. Part 1. Rhipidoglossa and Docoglossa, with an appendix by Prof. R. Bergh. *Siboga Expeditie 1899-1900*, Leiden, E. J. Brill **49a**: 1-107, pls 1-9.

SHOPLAND E. R., 1902. — List of marine shells collected in the neighbourhood of Aden between 1892 and 1901. *Proc. malac. Soc. Lond.* **5**: 171-179.

SMITH E. A., 1884. — Mollusca. *In Report of the zoological collections made in the Indian Ocean during the voyage of HMS "Alert", 1881-1882.* London, British Museum: 34-116.

SOUVERBIE S.-M., 1858. — Descriptions d'espèces nouvelles de l'archipel calédonien. *J. Conch.*, Paris **7** : 376.

— 1860a. — Descriptions d'espèces nouvelles de l'archipel calédonien. *J. Conch*, Paris **8** : 123-126.

Source : MNHN, Paris

— 1860b. — Descriptions d'espèces nouvelles. *J. Conch.*, Paris **8** : 369-371.
— 1861. — Descriptions d'espèces nouvelles de l'archipel calédonien. *J. Conch.*, Paris **9** : 271-284.
— 1875. — Descriptions d'espèces nouvelles de l'archipel calédonien. *J. Conch.*, Paris **23** : 282-295.
SOUVERBIE S.-M. & MONTROUZIER X., 1862. — Descriptions d'espèces nouvelles de l'archipel calédonien. *J. Conch.*, Paris **10** : 231-248.
— 1863a. — Descriptions d'espèces nouvelles de l'archipel calédonien et des îles Salomon et Woodlark. *J. Conch.*, Paris **11** : 161-176.
— 1863b. — Descriptions d'espèces nouvelles de l'archipel calédonien. *J. Conch.*, Paris **11** : 276-287.
— 1864. — Descriptions d'espèces nouvelles de l'archipel calédonien. *J. Conch.*, Paris **12** : 261-275.
— 1866. — Descriptions d'espèces nouvelles de l'archipel calédonien. *J. Conch.*, Paris **14** : 138-151.
— 1870. — Descriptions d'espèces nouvelles de l'archipel calédonien. *J. Conch.*, Paris **18** : 71-83.
— 1875. — Descriptions d'espèces nouvelles de l'archipel calédonien. *J. Conch.*, Paris **23** : 33-44.
— 1879. — Descriptions d'espèces nouvelles de l'archipel calédonien. *J. Conch.*, Paris **27** : 25-34.
SOWERBY G. B., 1886. — *Turbo. In Thesaurus conchyliorum*. London, Sowerby **5**: 189-234, pls 1-14 (493-506).
SPRINGSTEEN F. J. & LEOBRERA F. M., 1986. — *Shells of the Philippines*. Manila, Carfell Seashell Museum.
VIADER R., 1937. — Revised catalogue of the testaceous Mollusca of Mauritius and its dependencies. *Mauritius Inst. Bull.* **1** (2): i-xiii, 1-111, plus map.
WILSON B., 1993. — *Australian Marine Shells, Prosobranch Gastropods*. **1**, Kallaroo, Odyssey.

Source : MNHN, Paris

Source : MNHN, Paris

Bulletin du Muséum national d'Histoire naturelle, Paris, 4e série, **18**, 1996
Section A, nos 3-4 : 447-457

A living fossil *Waikalasma boucheti* n.sp. (Cirripedia, Balanomorpha) from Vanuatu (New Hebrides), Southwest Pacific

by John S. BUCKERIDGE

Abstract. — This paper describes *Waikalasma boucheti* n.sp., the first known living representative of the Eolasmatinae, a cirripede subfamily previously known only from the Palaeocene-Miocene of Australasia. The present material, recovered from the bathyal environment off Vanuatu, strengthens the case for *Waikalasma* being considered as the outgroup of all modern acorn barnacles, and provides further evidence to confirm the Eolasmatinae as one of the most primitive groups of the Balanomorpha.

Key-words. — *Waikalasma boucheti*, Eolasmatinae, Balanomorpha, Cirripedia, Vanuatu, Southwest Pacific.

Découverte d'une balane, fossile vivant, *Waikalasma boucheti* n.sp. (Cirripedia, Balanomorpha) aux Vanuatu (Nouvelles-Hébrides), sud-ouest Pacifique.

Résumé. — Cet article décrit *Waikalasma boucheti* n.sp., première espèce vivante des Eolasmatinae, une sous-famille de cirripèdes seulement connue du Paléocène-Miocène d'Australasie. Ce matériel, découvert dans un faciès bathyal au large de Vanuatu, confirme le fait que *Waikalasma* est un groupe extérieur des cirripèdes balanes et fournit une autre évidence que les Eolasmatinae sont l'un des groupes les plus primitifs des Balanomorpha.

Mots-clés. — *Waikalasma boucheti*, Eolasmatinae, Balanomorpha, Cirripedia, Vanuatu, sud-ouest Pacifique.

J. S. BUCKERIDGE, *Department of Civil and Environmental Engineering, UNITEC, Private Bag 92025, Auckland, New Zealand.*

INTRODUCTION

The first known species of *Waikalasma* was described as a fossil by BUCKERIDGE (1983), from the early Miocene Waikawau cast beds of Port Waikato, New Zealand. The genus is significant in that it possesses eight plates in the shell wall and is surrounded by two or more rows of smaller, imbricating plates. These characters are considered primitive (BUCKERIDGE 1983), and place *Waikalasma* not only early, but central in the phylogeny of the Balanomorpha (BUCKERIDGE & NEWMAN 1992; NEWMAN & YAMAGUCHI 1995; BUCKERIDGE 1996). The specimens described in this paper were collected either by a Waren dredge (DW), or beam trawl (CP), from waters near Vanuatu as part of the MUSORSTOM 8 (1994) expedition. Both specimens were recovered from what appears to have been a rocky substrate.

The barnacles are preserved in alcohol, and have been examined with the aid of light microscopy and dissection. In addition to photographs of the exterior of both holotype and paratype,

Source : MNHN, Paris

illustrations of the whole animal, shell and appendages, have been drawn with the aid of a camera lucida.

The holotype MNHN-Ci2428 and the paratype MNHN-Ci2506, have been deposited in the Muséum national d'Histoire naturelle (MNHN), Paris, France.

SYSTEMATIC PART

Family PACHYLASMATIDAE Utinomi, 1968
Subfamily EOLASMATINAE Buckeridge, 1983

DIAGNOSIS (emend.). — Shell of eight distinct compartmental plates, rostrolatera not entering sheath, second carinolatera barely entering sheath; basis membranous.

DISTRIBUTION (emend.). — Upper Palæocene to Lower Miocene (New Zealand), Lower Miocene (Victoria, Australia); Recent, 700-850 m (off Vanuatu).

DISCUSSION

When originally erected, this subfamily comprised two monotypic genera, represented by *Eolasma maxwelli* Buckeridge, 1983 (Lower Palæocene, New Zealand) and *Waikalasma juneae* Buckeridge, 1983 (Lower Miocene, New Zealand). Since then, the geographic distribution has been extended to the Miocene of Victoria, Australia, by *Eolasma rugosa* Buckeridge, 1985 and is now known from the Recent in seas off Vanuatu (previously known as the New Hebrides). Initially it was thought that there were no imbricating plates present, but close examination of the holotype of *Waikalasma juneae* demonstrated the remains of at least two whorls of small imbricating plates (BUCKERIDGE & NEWMAN 1992). In the same paper, following YAMAGUCHI & NEWMAN (1990), a new interpretation of capitular plate arrangement in *Waikalasma* was provided. It is this interpretation, of rostrum-rostrolatus-carinolatus-second carinolatus-carina (RRL-CL-CL_2-C), that is adopted here.

Genus **WAIKALASMA** Buckeridge, 1983

DIAGNOSIS (emend.). — Shell bilaterally symmetrical with eight solid, calcareous, weakly articulated compartmental plates, including very wide carina (C), moderately narrow rostrum (R), and narrower, paired rostrolatera (RL), carinolatera (CL) and second carinolatera (CL_2); alae well developed, particularly on carina, but almost confluent with paries; radii absent; with two or more whorls of imbricating plates; basis membranous; caudal appendages absent.

DISTRIBUTION (emend.). — Lower Miocene to Recent. Oceania.

TYPE SPECIES. — *Waikalasma juneae* Buckeridge, 1983. Miocene (Aquitanian), Port Waikato, New Zealand.

Source : MNHN, Paris

Discussion

The origin of the Balanomorpha is within the Brachylepadomorpha, and a clear lineage can be deduced with *Waikalasma* and *Eochionelasmus* placed at the earliest stages of balanomorph radiation (Buckeridge & Newman 1992; Newman & Yamaguchi 1995). However, the hard parts of *Waikalasma* differ primarily from a *Neobrachylepas* form in only two ways: the loss of median latera, and the adoption of a configuration whereby imbricating plates are added to the shell from outside the preceding whorl. The soft parts of *Waikalasma* are quite distinct from those of *Neobrachylepas*, which are rather unusual and have been interpreted as adaptations to feeding (Newman & Yamaguchi 1995). The structural arrangement of *Waikalasma* represents a grade of organisation between balanomorphs with three pairs of partially and fully integrated latera, and also between those with numerous whorls of basal imbricating plates and those with none.

Waikalasma boucheti n.sp.
(Figs 1a-f; 2a-g; 3a-h; 4a, b)

Material examined. — Vanuatu, MUSORSTOM 8: stn CP 1080, 15°57'S – 167°27'E, 799-850 m, 5.X.1994, 1 specimen (holotype); stn DW 1113, 14°53'S – 167°06'E, 700-736 m, 8.X.1994, 1 specimen (paratype).

Etymology. — The new species is named for Philippe Bouchet, Muséum national d'Histoire naturelle, Paris. Dr Bouchet was one of the principal scientists on the 1994 MUSORSTOM expedition.

Habitat. — Station CP 1080 was situated eleven kilometres off the north east coast of île Malekula. The barnacle was attached to a brown, weathered, tuffaceous sandstone, the broken surface of which suggests that this may have been an outcrop rather than a large pebble. Associated fauna at this site was rich, including teleosts, scaphopods, gastropods and other crustaceans. The specimen from stn DW 1113 was recovered from nine kilometres off the north east cape of île Santo, attached to a large pebble of fossiliferous sandy tuff. Both areas are characterised by expanses of both rocky (predominantly basaltic) and muddy bottoms. A full account of substrate and conditions is provided in Richer de Forges *et al.* (1996).

Diagnosis

Waikalasma with two or more whorls of large imbricating plates, inner whorl with total of eight plates; scutum triangular and very elongate with long, low articular ridge, adductor muscle scar weak, central; tergum narrow, inverted "V-shaped", with deeply excavated basal margin; spur at basiscutal angle.

Description

Holotype (MNHN-Ci2428): rostro-carinal diameter 30.7 mm; width 32.5 mm; height 24.7 mm. Base membranous.

Paratype (MNHN-Ci2506): rostro-carinal diameter 26.2 mm; width 23.2 mm; height 12.8 mm.

Carina well developed, semi-conic, with extended alae, approximately 1.5 times height of rostrum. Lateral plates approximate, separated by very narrow alar zones, RL and CL_2 clearly separated from paries of rostrum and carina respectively by broad exposed alar areas on latter plates. Internally, RL not entering the sheath, CL_2 only slightly, extending into sheath as very

Source : MNHN, Paris

narrow zone of less than 1 mm wide; RL exposed for approximately 70 % of distance between basal margin and sheath, being otherwise overlapped by CL. All plates transversely sculptured with fine growth lines, each lateral plate with central, very weakly developed longitudinal rib. On most plates, growth lines with slight basal deflection approaching rib. Carina, with three similar, but less clearly defined ribs. Basally ribs approximately aligned with edges of first whorl of imbricating plates. Alae almost confluent with paries, possessing fine apico-basal striae transversely cutting well formed growth lines, latter slightly inflected at alar margin, welting absent. Holotype with imbricating plates arranged in two whorls with eight plates in each; inner plates larger, up to 6.3 mm high and 9.4 mm wide, and placed to overlap area of abutment of compartmental plates, inner whorl of imbricating plates in turn overlapped by outer whorl of plates of up to 1.7 mm height (Fig. 1f); imbricating plates develop "alar extensions" about 1 mm wide on overlapped margins; both whorls of imbricating plates closely approximate basally, forming 3.2 mm thick skirt of laminae, angling inwards to outer edge of the compartmental plates. Skirt, and base of compartmental plates in contact with substrate. Imbricating plates grow by addition of laminae from base, with outermost plates newest; laminae of both first and second whorls confluent, although in holotype, plates in outer whorl (= earliest) lack laminae.

Opercula

Tergum narrow, inverted "V-shaped", basal margin deeply excavated; apico-basal ridge broadly concave towards carina, basally becoming full width of projected basal angle; articular ridge low, quadrangular; interior lacking adductor muscle scars or furrows; exterior with well developed transverse growth lines on apico-basal and articular ridges. Scutum elongate, triangular, occludent margin 2.6 times length of basal margin; internally with very weakly developed, centrally placed, adductor muscle pit; articular ridge low, about half length of gently concave articular margin; exterior with well developed transverse growth lines, crossed by weak longitudinal striae.

Soft parts

Mandible tridentate, lower angle accuminate with two groups of short spines; first maxilla with two large and three small upper spines, notch poorly developed, centrally with group of five large spines, lower angle with three medium spines, relatively hirsute overall. Penis rudimentary, without basidorsal point. Labrum gently curved, with two or three small teeth on each side near palps, and very finely denticulated surfaces lower on either side. Palps well separated, rounded, with setae on both inner and outer sides. No eggs or branchiae were noted.

Cirri

Cirri I and II with anterior rami with one segment fewer than posterior rami. Cirrus II more like cirrus III than cirrus I. Anterior rami of cirri III, V and VI with two or three more segments than posterior rami. Cirrus IV with anterior rami longer than posterior, but appendage may have been damaged. Cirrus VI with four pairs of large setae on anterior margin of intermediate segments. Segment count per ramus as follows (anterior, posterior):

I	II	III	IV	V	VI
14, 15	24, 25	29, 32	31, 29	31, 34	29, 31

Source : MNHN, Paris

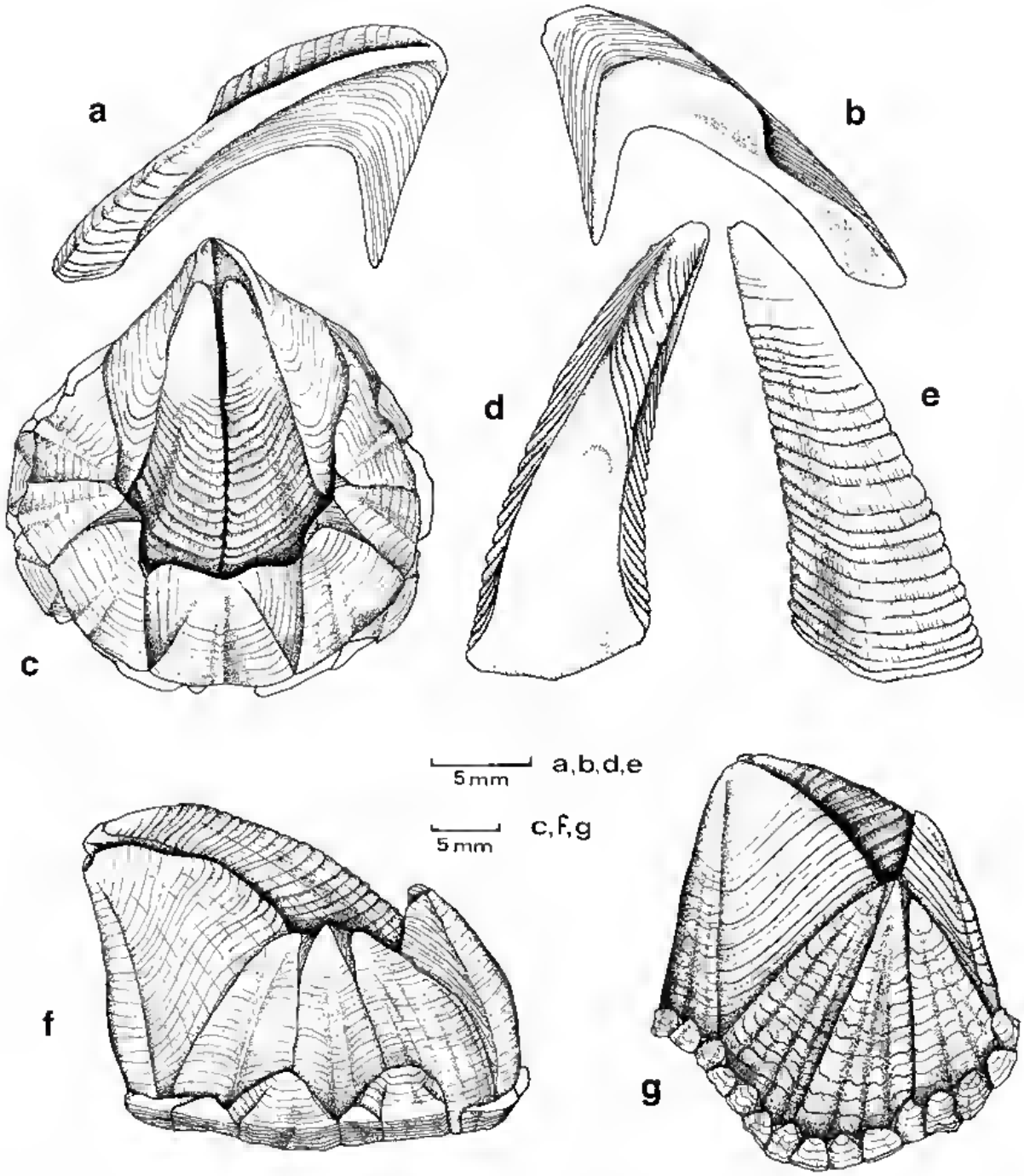


FIG. 1. — Eolasmatinae. a-f, *Waikalasma bouchet* n.sp. Holotype, MNHN-Cr2428. a, tergum (right), exterior; b, same, interior; c, dorsal view of whole specimen; d, scutum (left), interior; e, same, exterior; f, lateral view of whole specimen (left side); g, *Waikalasma juneae* Buckeridge, 1983, lateral view of whole specimen (left side), reconstruction to show placement of opercula and imbricating plates.

Source : MNHN, Paris

Colour (in alcohol)

The holotype shell is creamy-white internally and externally stained a dark brownish yellow. The paratype is cream both internally and externally. Soft tissue in the holotype has a strong purple tint, particularly on the cirri.

REMARKS

The paratype, although smaller, possesses a total of twenty-seven imbricating plates. These may be recognised as an inner whorl of eight plates, each overlapping a suture in the compartmental wall, a second whorl of twelve plates (variously interleaved and overlapping), a third whorl of six plates (generally overlapping) and a fourth whorl of one plate (Fig. 2f). The plates are smaller than in the holotype, with only one being over 5 mm in height. From the structure of the paratype it is easy to see how new plates are added to the outer imbricating whorl(s): addition is not regular, being accomplished either by interleaving with, or overlapping of, adjacent plates. At the base of the carina, (the region of greatest compartmental growth), plates are first interleaved, then placed to overlap (Fig. 4b). This pattern is essentially the same as that observed in shell compartmental growth: a primary wall of four plates (R-CL-C-CL) is enlarged by replication of the CL to produce the CL_2, which is interleaved between the C and CL; this is followed by addition of the RL, which overlaps both R and CL (see Fig. 4).

In the holotype, both opercula show significant wear in the apical regions, with the tergum this "smoothed area" extends for more than half the length of the apico-basal ridge; with the scutum, wear is confined to the upper third of the occludent margin.

The absence of caudal appendages in *W. boucheti* is intriguing, as these would have strengthened the status of *Waikalasma* as an excellent outgroup for the Pachylasmatinae. But caudal appendages, as are found in *Pachylasma*, are considered to be plesiomorphic. Natural processes however, are notably irregular, and this is certainly observed in sessilian phylogeny, where clear linear relationships, confirmed by sequential loss of pleisiomorphies, are rarely found (BUCKERIDGE 1996). The presence of a rudimentary penis may indicate the possibility of this species possessing complemental males, none were observed.

The discovery of two specimens of an extant *Waikalasma* species provides an opportunity to confirm a number of unusual characteristics that previously defined a unique, intact, but fossilized, specimen of *Waikalasma juneae*. In particular, the tight grouping of the lateral plates, with very little space between RL, CL and CL_2 is confirmed. Further, it is clear that the RL does not enter the sheath. Although the latter character was suspected in the fossil material, the fragility of that specimen prevented excavation of sediment from the interior to confirm this. Unfortunately both specimens of *W. boucheti* are adults, so do not provide conclusive evidence of the manner in which the lateral plates are added, *i.e.* during ontogeny, is the CL_2 intercalated into the wall as in higher balanomorphs? This is certainly something additional specimens may be able to clarify.

Waikalasma boucheti n.sp. (Fig. 1a-f), may be distinguished from *W. juneae* (Fig. 1g), by possessing proportionately shorter and clearly rostrally directed lateral plates. NEWMAN (pers. comm.) now considers that *W. juneae* probably had about thirty imbricating plates, possibly arranged in two whorls. His conclusion is based on the ribs or groves in the compartmental

Source : MNHN, Paris

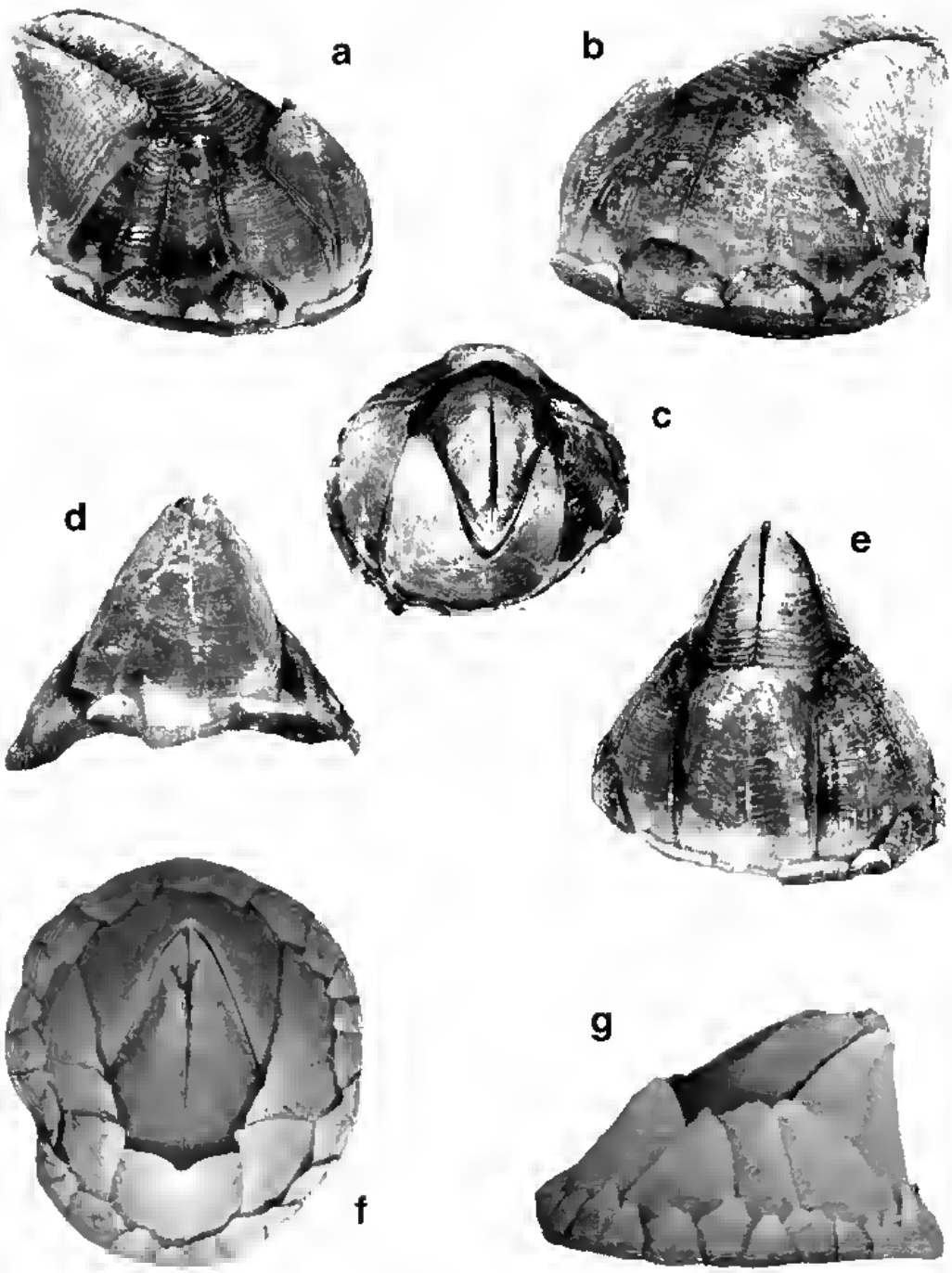


FIG. 2. — *Waikalasma bouchet* n.sp. a-e, holotype, MNHN-Ct2428: a, lateral view of whole specimen (left side); b, lateral view of whole specimen (right side); c, dorsal view of whole specimen; d, carinal view of whole specimen, e, rostral view of whole specimen. f-g, paratype, MNHN-Ct2506: f, dorsal view of whole specimen; g, lateral view of whole specimen (right side). (scale: a-e × 1.74, f-g × 2.17). Photography by P. Lozouet, MNHN, Paris (BIMM).

Source : MNHN, Paris

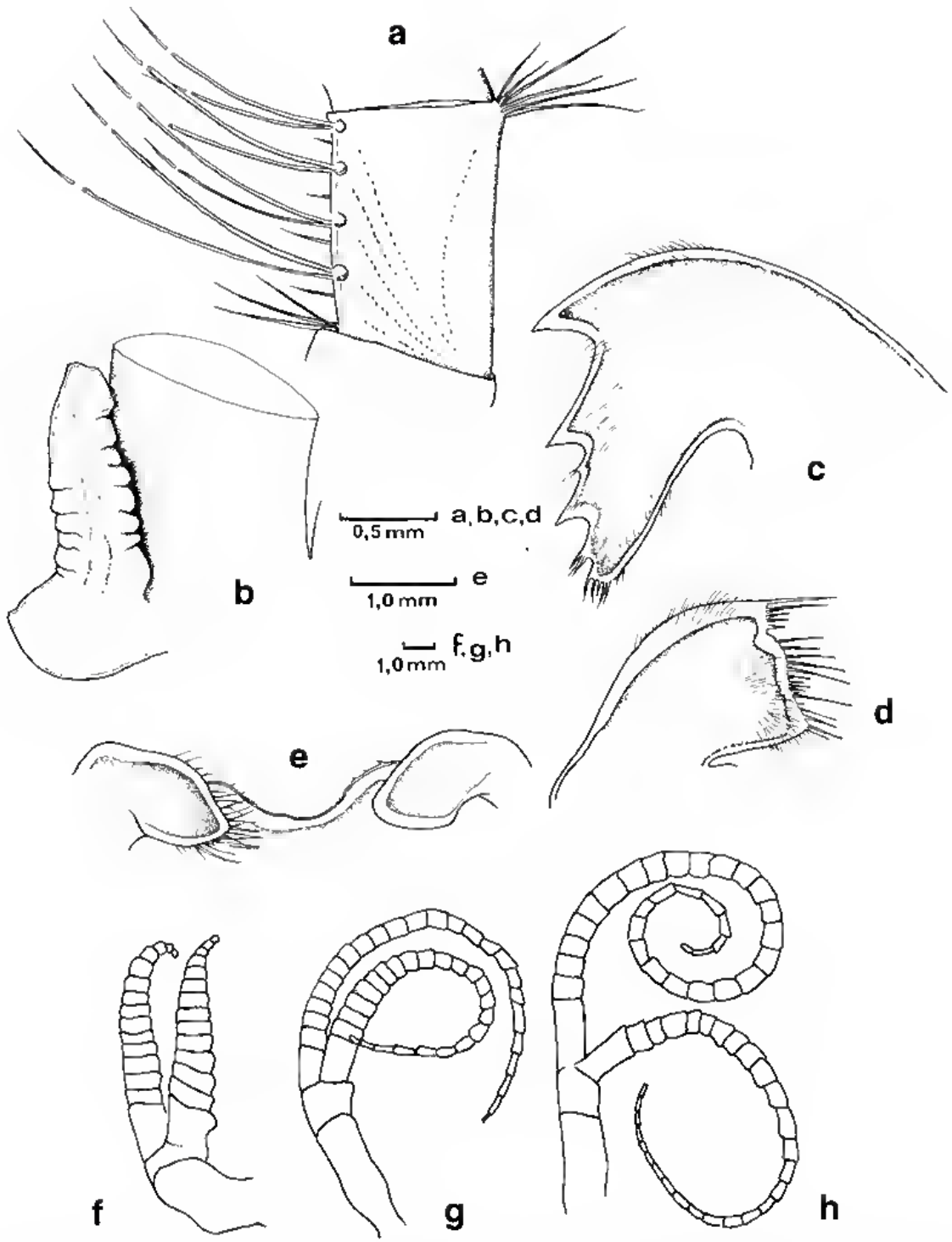


FIG. 3. — *Waikalasma boucheti* n.sp. Holotype, MNHN-Cr2428: a, intermediate segment of cirrus VI showing setal arrangement (right side); b, penis and basal portion of cirrus VI; c, mandible (right side); d, first maxilla (left side); e, labrum and palps (setae shown on left palp only); f, cirrus I (left side); g, cirrus II (left side); h, cirrus III (left side). Cirri I-III shown with setae removed.

Source : MNHN, Paris

plates, and is accepted here. It necessitates considerably fewer imbricating plates than in the reconstruction given in BUCKERIDGE & NEWMAN (1992), and is now much closer to the arrangement seen in *W. boucheti*. Although a very weak medial rib was observed on lateral plates of *W. juneae*, these appear more clearly defined on the living material. The scuta of *W. boucheti* are quite unlike that figured and tentatively attributed to *W. juneae* by BUCKERIDGE (1983: 64). I am now confident that his figure 48 (showing a rather broad valve, with a well formed adductor muscle scar) is not of *W. juneae*, rather, it probably represents another bathylasmatid or a worn balanid scutum. Based on the present reconstruction of *W. juneae* (Fig. 1g), it is clear that the scuta of this species would have been proportionately much shorter than those of *W. boucheti*.

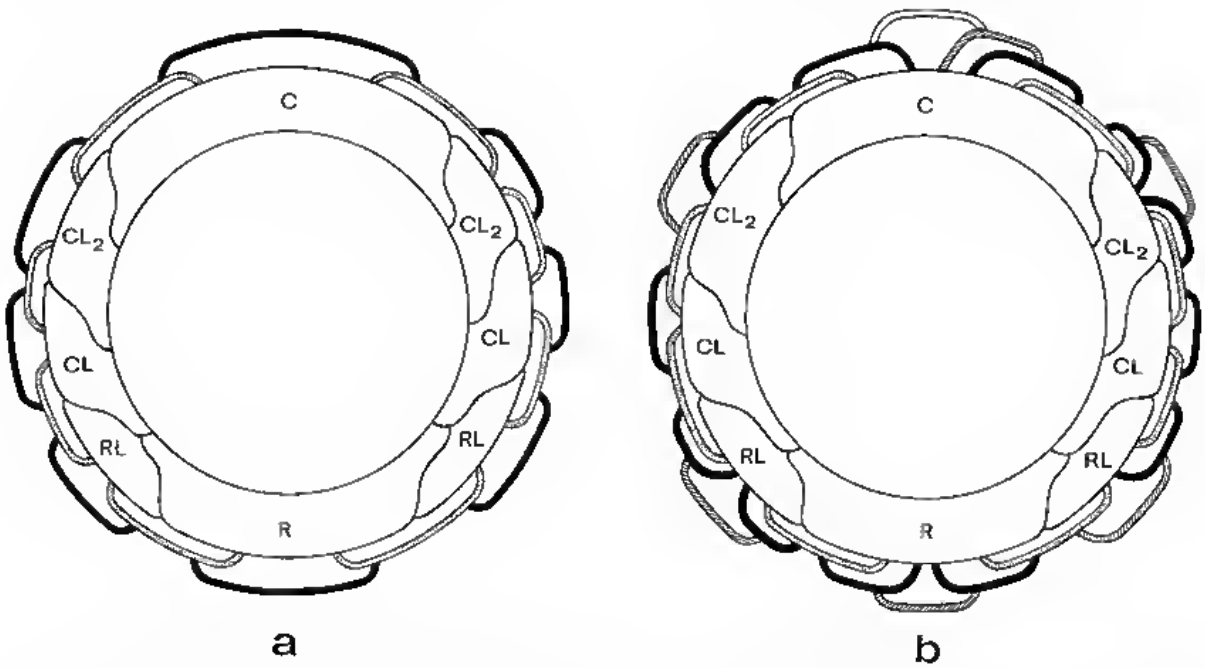


FIG. 4. — *Waikalasma boucheti* n.sp. Schematic plate arrangement (dorsal plans): a, holotype, MNHN-Cl2428, showing inner (stippled) and outer (hatched) whorls, both of eight plates, each overlapping a suture in the inner whorl adjacent; b, paratype, MNHN-Cl2506, showing inner whorl (stippled), of eight plates, each overlapping a suture in the compartmental wall, a second whorl (black), of twelve plates (variously interleaved and overlapping); a third whorl (hatched) of six plates, generally overlapping; a fourth? whorl of one plate, (clear), overlapping plates on second and third whorls. (Note: this diagram demonstrates relationships between plates. It is neither to scale, nor in proportion.). Drawning by J. Rebière, MNHN, Paris (Lab. Zoologie Arthropodes).

AFFINITIES

The number of both compartmental plates and imbricating whorls are sufficient to distinguish this material from *Chionelasmus*, which has a rostrum, carina and four latera in the primary wall, and one whorl of imbricating plates in adults; *Pachylasma* and *Bathylasma* may be differentiated from *Waikalasma* by a lack imbricating whorls. The comparatively larger carina and the intercalation of six lateral plates into the compartmental wall distinguish this genus from

Source : MNHN, Paris

Eochionelasmus. Of the plate structure, the lack of welting in *Waikalasma* places it closer to the Chionelasmatinae than the Pachylasmatinae. As previously noted, the soft parts are quite distinct from *Eochionelasmus*, but as with *Neobrachylepas*, this is likely to be a special trophic adaptation in the latter (YAMAGUCHI & NEWMAN 1990). In general however, the soft parts of *Waikalasma boucheti* are not particularly noteworthy, the maxilla, mandible and labrum are similar to many species within the Pachylasmatinae and Bathylasmatinae, although the absence of caudal appendages distinguishes this genus from *Eochionelasmus*, *Chionelasmus* and *Pachylasma*. Using the absence of characters like caudal appendages in establishing "antiquity" for a group must be approached with caution. If *Waikalasma* is indeed a good candidate as an outgroup for the Pachylasmatinae, and I believe this is so, then it is quite likely that caudal appendages may have been lost some time between the Middle Miocene and the Present, long after the first pachylasmatines appear in the fossil record.

The discovery of *Waikalasma boucheti* n.sp. from the living fauna was quite unexpected. The *Waikalasma* body plan was initially considered as a brief interlude in balanomorph phylogeny (BUCKERIDGE 1983). In this sense *W. boucheti* may truly be viewed as a living fossil. Unlike many other recent and significant discoveries in cirripede phylogeny (*e.g.* NEWMAN 1979, 1985), this material is not associated with a hydrothermal vent environment.

BIOGEOGRAPHY

The Southwest Pacific is confirmed to be of particular significance in sessilian evolution, as 73% of primitive balanomorphs with a generic age older than the Miocene have their earliest records there (BUCKERIDGE 1996). Local endemicity at high taxonomic levels is attributed by NEWMAN (1985) to be either the result of isolation, or association with severe environmental gradients or ecotomes. Although this species is not part of a hydrothermal vent community, such as described by NEWMAN (*loc. cit.*), it is both insular and bathyal, like so many other pachylasmatine and bathylasmatine refugial taxa.

Acknowledgements

The author wishes to sincerely thank Alain CROSNIER, ORSTOM (Institut français de recherche scientifique pour le développement en coopération), for the invitation to work on the MUSORSTOM collections, for providing access to the material, and for providing a stimulating working environment. Patsy MCLAUGHLIN (visiting scientist at the Muséum national d'Histoire naturelle, Paris), provided thoughtful and invaluable encouragement, and reviewed the manuscript, as did William NEWMAN (Scripps Institution of Oceanography, California, United States).

REFERENCES

BUCKERIDGE J. S., 1983. — Fossil barnacles (Cirripedia: Thoracica) of New Zealand and Australia. *N. Z. Geol Surv Paleontol Bull.* **50**: 1-151.

— 1985. — Fossil barnacles (Cirripedia: Thoracica) from the lower Miocene Limestone, Batesford, Victoria. *Proc. Roy. Soc. Victoria* **97** (3): 139-150.

Source : MNHN, Paris

— 1996. — Phylogeny and Biogeography of the Primitive Sessilia and a consideration of a Tethyan origin for the group. *Crustacean Issues*, A. A. Balkema Publishers, Rotterdam, 1995 (1996) **10**: 255-267.

BUCKERIDGE J. S. & NEWMAN W. A, 1992. — A re-examination of genus *Waikalasma* (Cirripedia: Thoracica) and its significance in balanomorph phylogeny. *Jo. Pal* **66** (2): 341-345.

NEWMAN W. A., 1979. — A new scalpellid (Cirripedia); a Mesozoic relic living near an abyssal hydrothermal spring. *Trans San Diego Soc. Nat. Hi stn.* **19** (11):

— 1985. — The abyssal hydrothermal vent invertebrate fauna: a glimpse of antiquity? *Biol. Soci. Wash Bull.* **6**: 231-242.

NEWMAN W. A. & YAMAGUCHI T., 1995. — A new sessile barnacle (Cirripedia, Brachylepadomorpha) from the Lau Back-Arc Basin, Tonga; first record of a living representative since the Miocene. *Bull. Mus. natl Hist. nat.*, Paris, 4e sér., **17** (3-4): 221-243.

RICHER DE FORGES B., FALIEX E. & MENOU J.-L., 1996. — La campagne MUSORSTOM 8 dans l'archipel de Vanuatu. Compte-rendu et liste des stations. *In* A. CROSNIER (ed.) Résultats des Campagnes MUSORSTOM Vol. 15. *Mém. Mus. natl Hist. nat.* **168** : 9-32.

YAMAGUCHI T. & NEWMAN W. A., 1990. — A new and primitive Barnacle (Cirripedia: Balanomorpha) from the North Fiji Basin Abyssal Hydrothermal Field, and its evolutionary implications. *Pacific Sci.* **44**: 135-155.

Note added in proof

Since the acceptance of this manuscript for publication, a further incomplete specimen, probably attributable to *Waikalasma boucheti* has been identified by Diana JONES (Western Australian Museum, Perth, Australia), from Loyalty Ridge, Bathus 3, stn DW 778, 24°43'S – 170°07'E, 750-760 m.

Source : MNHN, Paris

Source : MNHN, Paris

Bulletin du Muséum national d'Histoire naturelle, Paris, 4e série, **18**, 1996
Section A, nos 3-4 : 459-545

The terrestrial Isopoda of Corsica (Crustacea, Oniscidea)

by Stefano TAITI & Franco FERRARA

Abstract. — Seventy-six species of terrestrial isopods are recorded from Corsica. Eight species (*Oritoniscus punctatus*, *Tiralascia montana*, *Platyarthrus corsicus*, *Cylisticus uncinatus*, *Alloschizidium campanellii*, *Armadillidium lanzai*, *A. littorale* and *A. torchioi*) are described as new and twelve are newly recorded from the island. The subspecies *Oritoniscus paganus paganus* Racovitza and *O. paganus ocellatus* Vandel are raised to species rank. *Phallaniscus pygmaeus* (Budde-Lund) is transferred to the genus *Sardoniscus* Arcangeli, and *Paraschizidium remyi* Vandel and *Typhloschizidium cottarellii* Argano & Pesce to the genus *Alloschizidium* Verhoeff, of which *Typhloschizidium* Arcangeli and *Nesolidium* Verhoeff are considered to be junior synonyms. About half of the species have a West-Mediterranean distribution, the majority being strictly Tyrrhenian (38%). About 25% of the species are endemic, which demonstrates the importance of Corsica as a speciation area. The oniscidean fauna of Corsica is strictly related to that of the Tuscan Archipelago and, to a lesser extent, to that of Sardinia. Some important faunistic affinities exist with southern France (massifs of Maures and Estérel, and the Grasse region) and the Pyrénées. No species of southern origin (Sicilian or North African) has been collected in Corsica, which seems to exclude a zoogeographic relationship with those regions. The distribution of the species within Corsica is discussed. A key to all the species is given.

Key-words. — Crustacea, Isopoda, Oniscidea, taxonomy, new species, zoogeography, Corsica.

Les isopodes terrestres de Corse (Crustacea, Oniscidea)

Résumé. — Soixante-seize espèces d'isopodes terrestres sont signalées de Corse. Huit espèces nouvelles (*Oritoniscus punctatus*, *Tiralascia montana*, *Platyarthrus corsicus*, *Cylisticus uncinatus*, *Alloschizidium campanellii*, *Armadillidium lanzai*, *A. littorale* et *A. torchioi*) sont décrites et douze sont nouvellement citées de l'île. Les sous-espèces *Oritoniscus paganus paganus* Racovitza et *O. paganus ocellatus* Vandel sont élevées au rang d'espèce. *Phallaniscus pygmaeus* (Budde-Lund) est transféré dans le genre *Sardoniscus* Arcangeli, *Paraschizidium remyi* Vandel et *Typhloschizidium cottarellii* Argano & Pesce dans le genre *Alloschizidium* Verhoeff, dont *Typhloschizidium* Arcangeli et *Nesolidium* Verhoeff sont des synonymes plus récents. La moitié environ des espèces a une distribution Ouest-méditerranéenne, la plupart étant strictement tyrrhénienne. A peu près 25 % des espèces sont endémiques, ce qui prouve l'importance de la Corse en tant que zone de spéciation. Les caractères de la faune des isopodes terrestres de Corse montrent une stricte corrélation avec les caractères de la faune de l'archipel toscan et, à un degré moindre, avec ceux de la Sardaigne. Des affinités faunistiques importantes existent entre la Corse et la France méridionale (massifs des Maures et de l'Estérel et région de Grasse) et aussi avec les Pyrénées. Aucune espèce d'origine plus méridionale (sicilienne ou nord-africaine) n'a été recueillie en Corse, ce qui semble exclure toute relation zoogéographique avec ces territoires. La distribution des espèces en Corse est aussi discutée. Une clé des espèces est proposée.

Mots-clés. — Crustacea, Isopoda, Oniscidea, taxonomie, espèces nouvelles, zoogéographie, Corse.

S. TAITI & F. FERRARA, *Centro di Studio per la Faunistica ed Ecologia Tropicali del Consiglio Nazionale delle Ricerche, Via Romana 17, 50125 Firenze, Italy.*

Source : MNHN, Paris

INTRODUCTION

The terrestrial isopods from Corsica, as well as from many islands in the western Mediterranean, are apparently well known, thanks to the work of VANDEL who provided an important picture of the oniscidean population of the island in several contributions (1944a, 1944b, 1945, 1953a, 1954a, 1954b, 1954c, 1960, 1962, 1968a). Moreover, the Oniscidea from many Corsican caves have been thoroughly investigated by BERON (1972a, 1972b). However, the systematics of this group of crustaceans has changed markedly in recent years, becoming more precise and reliable, and the study of limited collections has already provided interesting results, with the description of a new genus, two new species and the report of a new form for the island (TAITI & FERRARA 1980; FERRARA & TAITI 1983). Therefore, we believed it appropriate to carry out the most complete study possible of the terrestrial isopod fauna of Corsica.

Most of the material studied was collected during six expeditions of the Centro di Studio per la Faunistica ed Ecologia Tropicali, C.N.R., Florence, which covered most of the island and its characteristic biotopes. Material deposited in the following institutions has also been examined: Muséum national d'Histoire naturelle, Paris (MNHN); Staatliches Museum für Naturkunde, Stuttgart (SMNS); National Natural History Museum, Sofia; Museo Civico di Storia Naturale, Verona (MV), and Dipartimento di Biologia Evolutiva dell'Università, Siena. Specimens collected during some expeditions of the Museo Zoologico "La Specola" dell'Università, Florence (MZUF), on many of the islets surrounding Corsica (LANZA & POGGESI 1986) have also been studied.

Family TYLIDAE
Genus **TYLOS** Audouin, 1826

Tylos europaeus Arcangeli, 1938
(Fig. 1)

?Tylos latreillei; VANDEL 1954a: 73.
Tylos europaeus; GIORDANI SOIKA 1954: 75.
Tylos latreillei europaeus; VANDEL 1960: 108, fig. 48A-C.

MATERIAL EXAMINED. — 13 ♂♂, 6 ♀♀, 1 juv., Calzarello (near Ghisonaccia), beach, leg. S. Taiti and S. Campanelli, 18.X.1982.

PREVIOUS RECORDS. — Porto-Vecchio (GIORDANI SOIKA 1954); Corsica (VANDEL 1954a).

DISTRIBUTION. — This littoral species is known with certainty from the coasts of the whole Mediterranean Sea and the Atlantic coasts of Europe as far north as Brittany (GIORDANI SOIKA 1954; VANDEL 1960).

REMARKS

Two taxa of *Tylos* occur in Corsica, as well as in Sardinia and some islands of the Tuscan Archipelago. According to VANDEL (1960) they represent two subspecies of *Tylos latreillei* Audouin, 1826 (*T. latreillii europaeus* Arcangeli, 1938 and *T. latreillii sardous* Arcangeli, 1938), while GIORDANI SOIKA (1954, 1972) and KUSSAKIN (1982) consider these two taxa as distinct species since they are well characterised from both morphological and ecological points of view

Source : MNHN, Paris

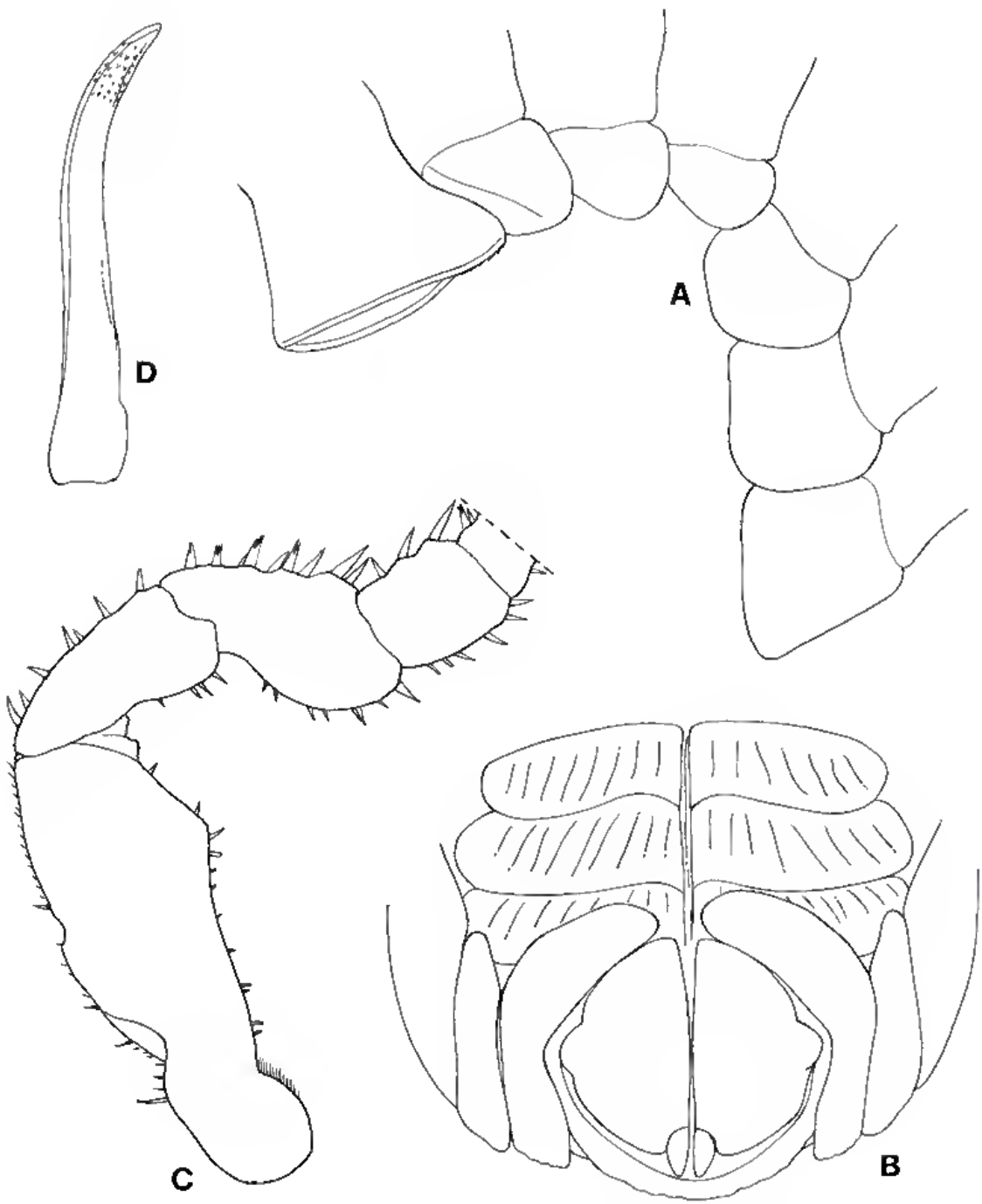


FIG. 1. — *Tylos europaeus*: A, pereonal epimera, dorsal; B, pleon and uropods, ventral; C, pereopod 1; D, ♂ pleopod 2 endopod.

Source : MNHN, Paris

(VANDEL 1960). The main problem is the correct identification of the true *T. latreillii*, to which one of these two forms most probably corresponds. GIORDANI SOIKA (1972) suggests the following synonyms: *T. sardous* Arcangeli, 1938 = *T. ponticus* Grebnitzky, 1874, and, tentatively, *T. europaeus* Arcangeli, 1938 = *T. latreillii* Audouin, 1826. In contrast, KUSSAKIN (1982) considers *T. europaeus* and *T. ponticus* as valid species, and *T. latreillii* a taxon incertae sedis. In our opinion *T. ponticus*, rather than *T. europaeus*, is a more probable synonym of *T. latreillii*. In fact, in the original figures of *T. latreillii* (AUDOUIN 1826, pl. 13, fig. 1.3) the ventral plates of pleonite 4 are arched and apically pointed, and those of pleonite 5 have apices obliquely truncate; these features are certainly more similar to those of *T. ponticus* than *T. europaeus* (see also VANDEL 1960). Since we are unable to solve with certainty the real synonymy of *T. latreillii*, for the moment we prefer to follow KUSSAKIN's opinion and maintain the names *T. europaeus* and *T. ponticus* for the two taxa.

It is difficult to define the exact distribution of the two species *T. europaeus* and *T. ponticus*, since in the literature both taxa have often been recorded with the name *T. latreillii*. Re-examination of the material studied by the different authors is necessary in order to determine to which of the two species those records belong.

Tylos europaeus is readily distinguished from *T. ponticus* by: the more developed groove on the lateral margin of pereonite 1 and the wider epimera of pereonites 2 to 7 (compare Fig. 1A and Fig. 2A); the ventral plates of pleonite 4 shorter and stouter, and those of pleonite 5 having rounded, instead of truncate, apices (compare Fig. 1B and Fig. 2B); the basis of pereopod 1 without a prominent triangular process on the tergal margin (compare Fig. 1C and Fig. 2C); and the male pleopod 2 endopod with a narrower and more curved apical part (compare Fig. 1D and Fig. 2D).

Tylos ponticus Grebnitzky, 1874
(Fig. 2)

Tylos sardous; GIORDANI SOIKA 1954: 73.
Tylos latreillei sardous; VANDEL 1960: 109, fig. 48D-E.
Tylos ponticus; LANZA & POGGESI 1986: 121, 180.

MATERIAL EXAMINED. — 8 ♂♂, Golfo di Sogno, leg. S. Taiti, 13.IV.1981; 6 ♂♂, 8 ♀♀, rocher d'Acciaju Nord (N of golfe de Sta Giulia), leg. B. Lanza, 8.VIII.1972.

PREVIOUS RECORDS. — Porto-Vecchio (GIORDANI SOIKA 1954); Corsica (VANDEL 1960); rocher d'Acciaju Nord (LANZA & POGGESI 1986).

DISTRIBUTION. — This species occurs on the coasts of the Mediterranean Sea, the Atlantic coast of northwestern Africa (GIORDANI SOIKA 1954), and probably the Red Sea (TAITI & FERRARA 1991).

Source : MNHN, Paris

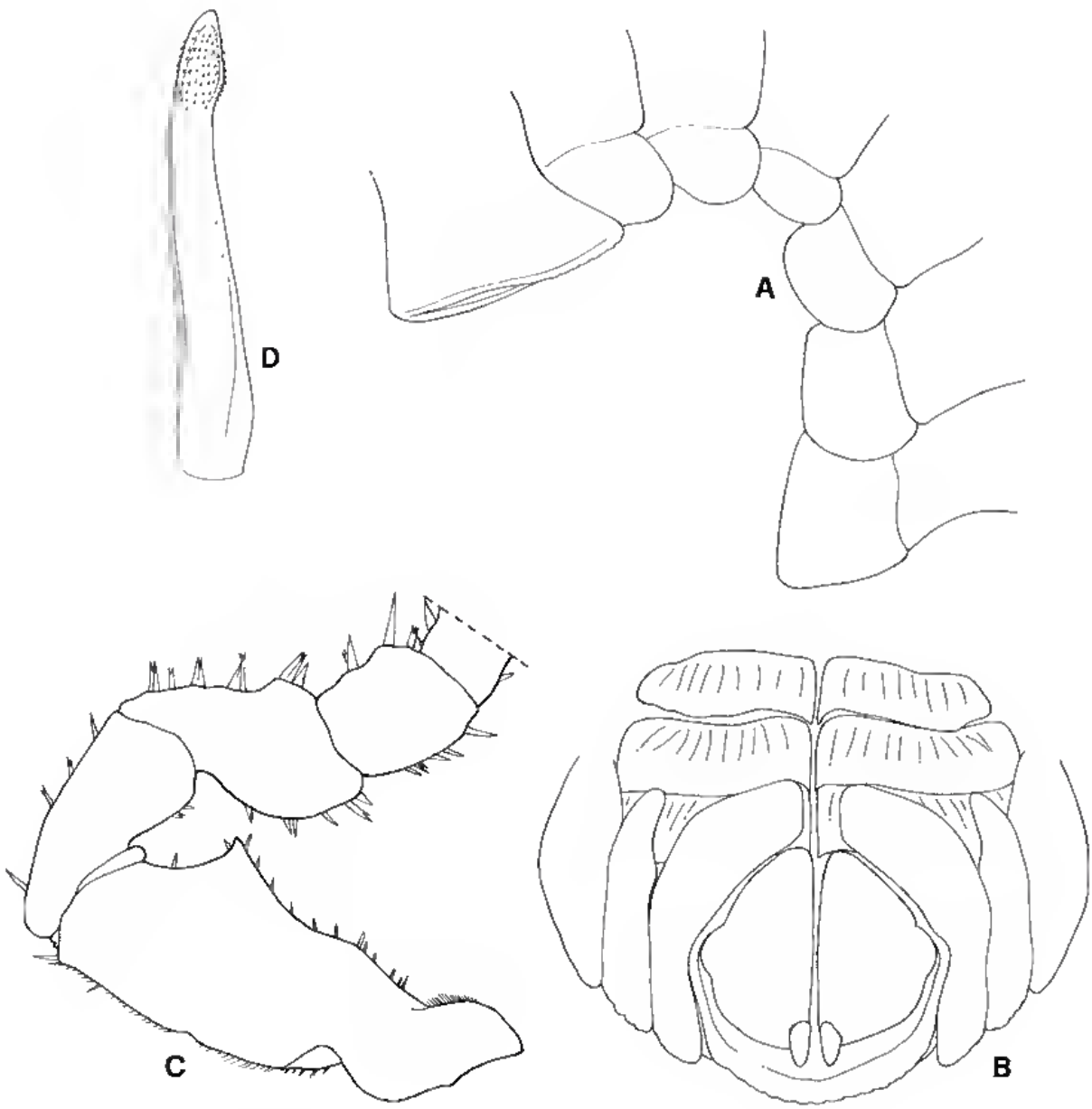


FIG. 2. — *Tylos ponticus*. A, pereonal epimera, dorsal; B, pleon and uropods, ventral; C, pereopod 1; D, ♂ pleopod 2 endopod.

Source : MNHN, Paris

Genus **HELLERIA** Ebner, 1868

Helleria brevicornis Ebner, 1868

Helleria brevicornis Ebner, 1868: 95, pl. I; Scharff 1894: 163; Dollfus 1899: 208; Arcangeli 1914: 481; 1925: 55; 1947: 373; 1950: 146, 149; Collinge 1941: 522; Vandel 1954a: 73; 1960: 110, figs 28, 47B, 49; Beron 1972a: 9; Lanza & Poggesi 1986: 121, 180.

Syspastus brevicornis; Budde-Lund 1885: 280; Verhoeff 1926: 263.

Material examined. — Many ♂♂ and ♀♀ collected from the following localities: Camera (near Centuri); 2 km SE of col de Ste-Lucie (between Pino and Luri); marine de Giottani; Selmacci (SW of Pietracorbara); St-Léonard (near marine de Pietracorbara); marine de Pietracorbara; Sta Catterina de Sisco; along the Sisco river, near Crosciano; marine de Sisco; Guado Grande (N of Nonza); Sta Maria-di-Lota (W of Miomo); Serra di Pigno (Bastia); between Bastia and St-Florent; défilé de Lancone, between Oletta and Casatorra; near Capo a u Cavallo (SW of Calvi); Francardo; Campana (N of Piedicroce); near Stazzona (S of Piedicroce); 2 km S of Carticasi; forêt de Valdo-Niello, Albertacce; Gorges de la Restonica; Elbo (NW of Girolata); plage de Caspio (NW of Porto); Porto and environs; Vecchio valley (S of Venaco); Sagone river valley, 6 km SW of Vico; U Castagno (Ghisoni); Ghisoni; col de Vizzavona; Cascades des Anglais (Vizzavona); 1 km W of Tolla (Prunelli river valley); near Suarella (N of Cauro); Zicavo; near Solenzara; 3 km N of col de la Vaccia (N of Aullène); between Alza and Argiavara (col de Bavella); col de Bavella; N of Aullène; Serra-di-Scopamène (S of Aullène); Zonza; Fiumicicoli river valley; S of Orone (W of l'Ospedale); forêt de l'Ospedale; Golfo di Sogno (N of Porto-Vecchio); Tizzano (SW of Sartène); rocher d'Acciaju nord (N of golfe de Sta Giulia).

Previous Records. — Ajaccio (Ebner 1868; Budde-Lund 1885; Scharff 1894); St-Florent (Budde-Lund 1885; Scharff 1894); Bastia (Scharff 1894; Dollfus 1899); Orezza, Vico, Vizzavona (Dollfus 1899); Ghisernia, Iaterni (Arcangeli 1914); between Bastia and Cardo, Sta Lucia, San Martino, near grotte de Brando, forêt d'Aitone (Evisa), Vizzavona, Punta di Borgo (Ajaccio) (Verhoeff 1926); Corsica, very common (Vandel 1960); grotte de Corte (Beron 1972a); rocher d'Acciaju nord (Lanza & Poggesi 1986).

Distribution. — This species has a North-Tyrrhenian distribution. It occurs in southern Provence, Corsica, Sardinia, some islands of the Tuscan Archipelago (Capraia, Elba, Pianosa) and Monte Massoncello (Livorno). Budde-Lund (1885) recorded this species at Genoa and Verhoeff (1910) at Ospedaletti (Imperia), but these records need confirmation; according to Vandel (1960) they represent occasional introductions.

Family Ligiidae
Genus **LIGIA** Fabricius, 1798

Ligia italica Fabricius, 1798

Ligia italica; Vandel 1954a: 73; 1960: 122, figs 54-56; Beaucournu 1967: 562; Beron 1972a: 9.

Material examined. — Many ♂♂ and ♀♀ collected from the following localities: Cap Corse; Capo Pertusato (SE of Bonifacio); île de la Giraglia; île Pietricaggiosa (Cerbicale); îlot Toro Piccolo; îlot La Folaca (near Palombaggia); îlot de la Roscana (golfe de Pinarello); îlot Sperduto Grande and îlot Sperduto Piccolo (E of île Cavallo).

Previous Records. — Corsica (Vandel 1960); grotte des Pigeons (Sagone) (Beaucournu 1967; Beron 1972a).

Distribution. — This species is common on the coasts of the whole Mediterranean, the Atlantic coast of the Iberian Peninsula and Atlantic islands (Azores, Madeira and Canaries).

Source : MNHN, Paris

Family TRICHONISCIDAE
Genus **FINALONISCUS** Brian, 1951

Finaloniscus briani Vandel, 1953
(Fig. 9)

Finaloniscus Briani Vandel, 1953a: 154, figs 1-4; 1954a: 73.
Finaloniscus briani; VANDEL 1960: 143, figs 61-64, 1968a: 356; BERON 1972a: 10, 1972b: 809.

MATERIAL EXAMINED. — 1 ♀, grotte de Sisco (N of Bastia), leg. W. Schawaller, 8.VIII.1980.

PREVIOUS RECORDS. — Grotte de Corte (Pietracorbara) (Vandel, 1953a); alluvial plains of lower Gravona river, E of Ajaccio (Vandel, 1960; 1968a; Beron, 1972a).

DISTRIBUTION. — Known only from the above localities.

Finaloniscus franciscoloi (Brian, 1951)
(Figs 3, 9)

MATERIAL EXAMINED. — 7 ♀♀, 3 juvs, marine de Giottani (between Nonza and Centuri-Port), leg. S. Taiti and A. Poggesi, 24.VI.1984; 3 ♀♀, Ogliastro (N of Nonza), leg. S. Taiti and A. Poggesi, 24.VI.1984; 4 ♂♂, 1 ♀, plage de Caspio (NW of Porto), leg. S. Taiti, 16.IV.1981.

DISTRIBUTION. — *Finaloniscus franciscoloi* was previously recorded from some caves of Savona Province (Liguria) (BOLOGNA & VIGNA TAGLIANTI 1985), from Tuscany (TAITI & FERRARA 1989a, 1995b) and Sicily (CARUSO *et al.* 1987).

REMARKS

These specimens correspond in all details to the descriptions of *F. franciscoloi* by BRIAN (1951) and VANDEL (1953b). Besides the two species present in Corsica, the genus *Finaloniscus* includes also *F. berberensis* Vandel, 1959 from Algeria and Morocco, which, according to its description (VANDEL 1959), is probably synonymous with *F. franciscoloi*.

Genus **NESIOTONISCUS** Racovitza, 1908

Nesiotoniscus corsicus Racovitza, 1908
(Figs 4, 9)

Trichoniscus (Nesiotoniscus) corsicus Racovitza, 1908: 360, pls XVI-XVIII, figs 226-257; VERHOEFF 1943: 159.
Trichoniscus corsicus; JEANNEL & RACOVITZA 1908: 389.
Trichoniscus (Phymatoniscus) corsicus; WOLF 1934: 73.
Nesiotoniscus corsicus; VANDEL 1947: 36; REMY 1950: 25; BRIAN 1953: 33; VANDEL 1953a: 160; TAITI & FERRARA 1995a: 313, fig. 4.

Source : MNHN, Paris

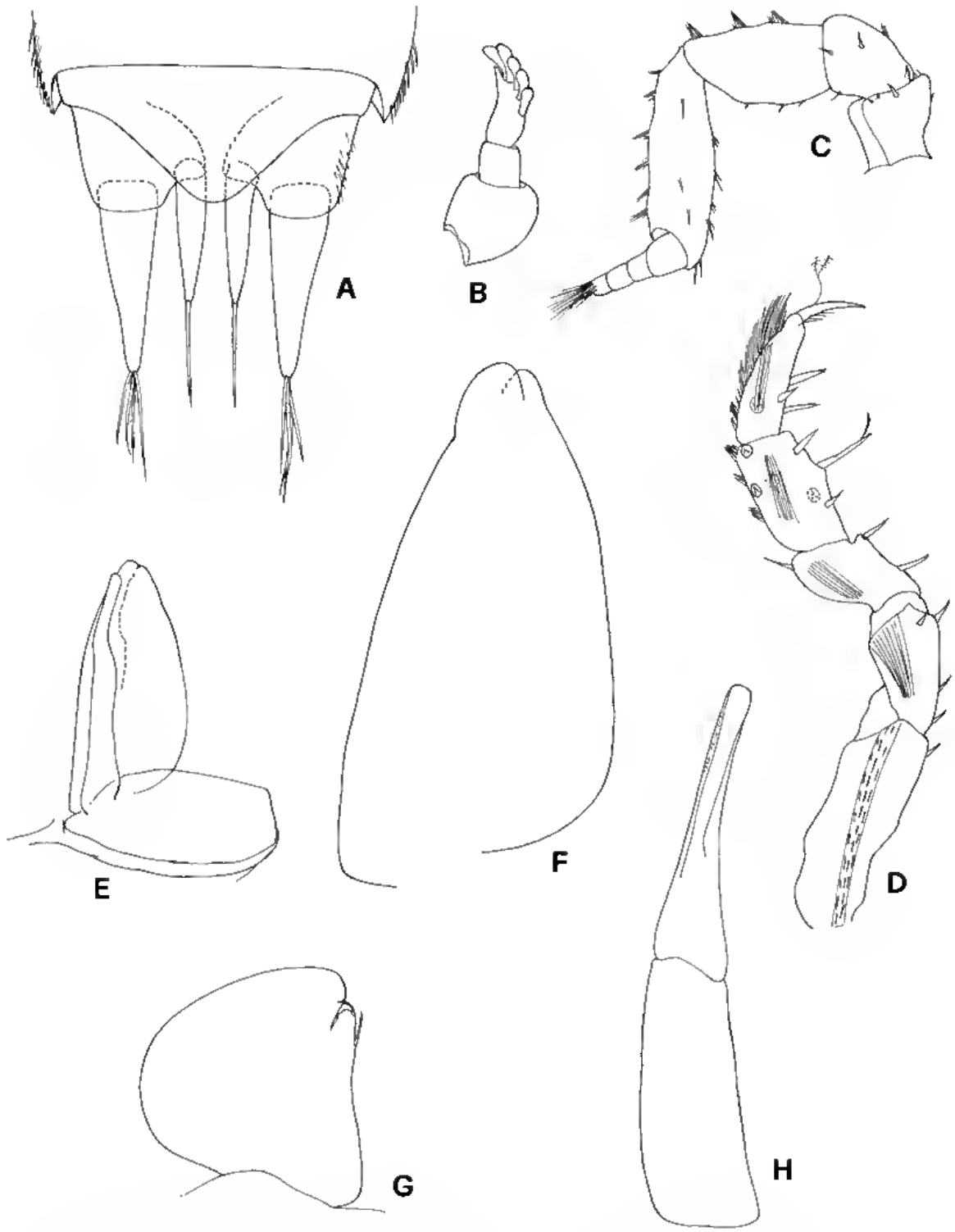


FIG. 3. — *Finaloniscus franciscoloi*, ♂: A, telson and uropods; B, antennule; C, antenna; D, pereopod 7, E, pleopod 1; F, pleopod 1 exopod; G, pleopod 2 exopod; H, pleopod 2 endopod.

Source : MNHN, Paris

Nesiotoniscus corsicus corsicus; VANDEL 1954b: 153; 1960: 179, fig. 80; 1968a: 357; BERON 1972a: 10; 1972b: 809; DALENS 1977: 181.

Nesiotoniscus paganus; VANDEL 1954a: 73.

Nesiotoniscus corsicus Racovitzai Vandel, 1954b: 154, fig. 2E (*partim*: Francardo, ? Propriano, ? Sartène).

Nesiotoniscus corsicus racovitzai; VANDEL 1960: 181, fig. 81C (*partim*: Francardo, ? Propriano, ? Sartène).

MATERIAL EXAMINED. — 4 ♂♂, 1 ♀, grotte de Pietralbello (Mottifao), leg. S. Taiti and S. Campanelli, 16.X.1982; 2 ♀♀, same locality, leg. P. Beron, 24.XI.1967; 1 ♂, same locality, leg. S. Taiti and S. Vanni, 7.III.1994; 4 ♂♂, 10 ♀♀, 3 juvs, 1.6 km from Siazzona, near road to Eaux d'Orezza, leg. S. Taiti and A. Poggesi, 20.VI.1984; 3 ♂♂, 2 ♀♀, 8 juvs, Francardo, right bank of Golo river, leg. S. Taiti and A. Poggesi, 22.VI.1984; 1 ♂, 3 ♀♀, Francardo, rive droite du Golo, à 100 m en aval du pont de la route nationale 193, alt. 266 m, leg. P. Rémy, 22.VIII.1942 (syntypes of *N. corsicus racovitzai*, MNHN); 1 ♂, 1 ♀, Monte Rosso (SE of Sartène), meadow near ilex grove, leg. S. Taiti and S. Campanelli, 20.X.1982; ? 1 ♀, Propriano, au nord de Sartène, sur le bord de la mer près du château, alt. 15 m, leg. P. Rémy, 18.IX.1948 (syntype of *N. corsicus racovitzai*, MNHN); ? 1 ♀, Sartène, jardins à l'ouest du couvent de San Damiano, alt. 300 m, leg. P. Rémy, 16.IX.1948 (syntype of *N corsicus racovitzai*, MNHN).

PREVIOUS RECORDS. — Grotte de Pietralbello (RACOVITZA 1908; JEANNEL & RACOVITZA 1908; WOLF 1934; REMY 1950; BRIAN 1953; VANDEL 1953a, 1954b, 1960, 1968a; BERON 1972a; DALENS 1977); Francardo, right bank of Golo river (VANDEL 1947, 1953a, 1954b, 1960); ? Propriano, ? Sartène (VANDEL 1954b, 1960); grotte de Grottone (Lama), grotte Roumandella (Caporalino), grotte de Cabanuli (Omessa) (VANDEL 1968a; BERON 1972a).

DISTRIBUTION. — Known only from Corsica.

REMARKS

VANDEL (1960) considers the taxa of *Nesiotoniscus* with a hook-like process on the male pereopod 7 merus as subspecies of *N. corsicus*. According to TABACARU (1993) and TAITI & FERRARA (1995a) they belong to distinct species: *N. corsicus* and *N. racovitzai* Vandel, 1955 from Corsica, *N. ribensis* Vandel, 1948 from the Grasse region (Provence) and *N. bernardi* (Vandel, 1943) from the massif of Estérel. These four species together with *N. harpagonifer* Taiti & Ferrara, 1995 from Capraia Island (Tuscan Archipelago) constitute a homogeneous group within the genus (*corsicus*-group).

Nesiotoniscus corsicus is widely distributed in the granitic part of Corsica. Some populations show small differences in the shape of the male pleopod 1 exopod (compare Fig. 4B, specimen from "grotte de Pietralbello", and Fig. 4E, specimen from Monte Rosso, SE of Sartène), but in our opinion these differences are within the variability of the species.

Re-examination of the type material of *N. racovitzai* showed that only the specimen from Solenzara (lectotype, see below) fits the description of the species (VANDEL 1954b, fig. 2D), while those from Francardo belong to *N. corsicus*. Most probably also the two syntypes females from Sartène and Propriano should be ascribed to *N. corsicus*, as suggested by the presence of this species in the same area (Monte Rosso).

Source : MNHN, Paris

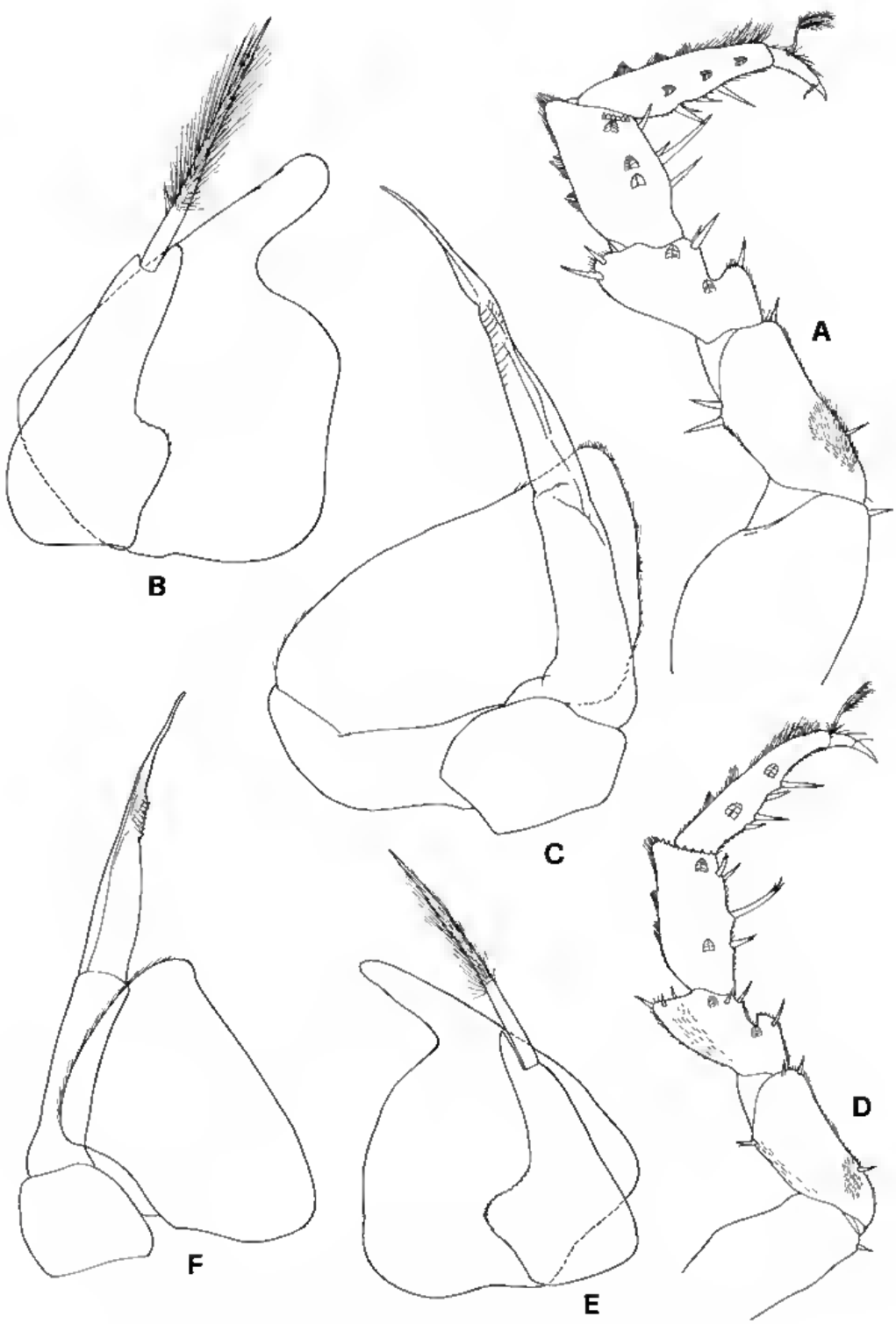


FIG. 4. — *Nesiotoniscus corsicus*, ♂ from grotte de Pietralbello. A, pereopod 7; B, pleopod 1; C, pleopod 2. ♂ from Monte Rosso; D, pereopod 7; E, pleopod 1; F, pleopod 2.

Source : MNHN, Paris

Nesiotoniscus racovitzai Vandel, 1954
(Figs 5, 9)

Nesiotoniscus corsicus Racovitzai Vandel, 1954b: 153, figs 2D, 3 (*partim*: Solenzara).
Nesiotoniscus corsicus racovitzai; VANDEL 1960: 180, fig. 81A, B, D (*partim*: Solenzara).
Nesiotoniscus racovitzai; TAITI & FERRARA, 1995a: 313, fig. 4.

MATERIAL EXAMINED. — 1 ♂ lectotype (specimen in micropreparation, MNHN-Is4105), Solenzara, Commune de Sari-di-Porto-Vecchio, ravin de Fontanaccia, entre la mer et la route nationale, alt. 2 m, leg. P. Remy, 3.IX.1948.

PREVIOUS RECORDS. — Solenzara (VANDEL 1954b, 1960).

DISTRIBUTION. — Known only from Corsica.

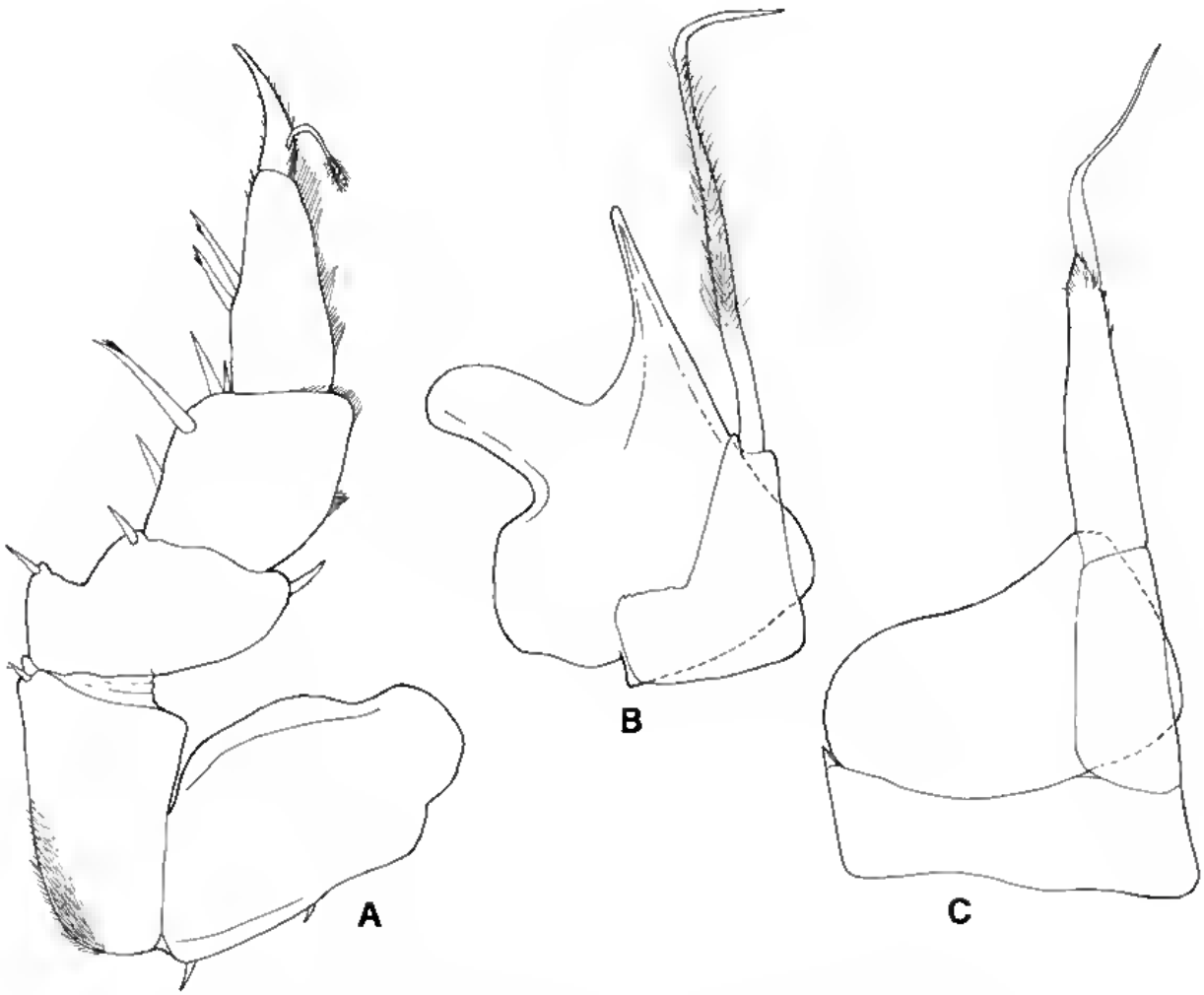


FIG. 5. — *Nesiotoniscus racovitzai*, lectotype: A, pereopod 7; B, pleopod 1; C, pleopod 2.

Source : MNHN, Paris

REMARKS

Nesiotoniscus racovitzai belongs to the *corsicus*-group on account of the hook-like process on the male pereopod 7 merus. It is readily distinguished from all other species in the group by the structure of the male pleopod 1 exopod which has a long narrow posterior point and a large subrectangular lobe on the external margin.

Genus **ORITONISCUS** Racovitza, 1908

Oritoniscus paganus Racovitza, 1908
(Figs 6A-D, 9)

Trichoniscus (Oritoniscus) paganus Racovitza, 1908: 233, pls XV-XVI, figs 181-211; WOLF 1934: 72.

Trichoniscus paganus; JEANNEL & RACOVITZA 1908: 389.

Oritoniscus paganus; REMY 1950: 7, 9, 25; VANDEL 1953a: 159 (*partim*: nec grotte des Tobi Pinnuti); 1954a: 73; BERON 1972b: 809.

Oritoniscus paganus paganus; VANDEL 1960: 213, fig. 100B (*partim*: nec grotte des Tobi Pinnuti); 1968a: 357 (*partim*: nec grotte des Tobi Pinnuti); BERON 1972a: 10 (*partim*: nec grotte des Tobi Pinnuti).

MATERIAL EXAMINED. — 2 ♂♂, 1 ♀, grotte de Pietralbello (Moltifao), leg. P. Beron, 24.XI.1967; 3 ♀♀, same locality, leg. S. Taiti and S. Campanelli, 16.X.1982; 1 ♂, 1 ♀, grotte de Roumandella (Caporalino), leg. S. Taiti, 12.V.1982; 14 ♂♂, 12 ♀♀, grotte de Sabara (Castiglione), leg. S. Taiti and S. Campanelli, 17.X.1982; 2 ♂♂, 1 juv., same locality, leg. S. Taiti and S. Vanni, 10.III.1994; 1 ♂, grotte de Cherpinede (Lano), leg. A. Torchia and S. Zoia, 26.V.1982; 2 ♀♀, same locality, leg. S. Taiti and A. Poggesi, 22.VI.1984.

PREVIOUS RECORDS. — Grotte de Pietralbello (RACOVITZA 1908; REMY 1950; VANDEL 1953a, 1960, 1968a; BERON 1972a); grotte de Sisco, grotte de Brando (REMY 1950; VANDEL 1968a; BERON 1972a); grotte de Corte (Pietracorbara) (VANOEL 1968a; BERON 1972a); grotte de Cherpinede, grotte de Sulane (Furiani), grotte de Cabanuli (Omessa), grotte de Sabara, grotte de Valletto (Santo-Pietro-di-Venaco), grotte de Leccia-Torta (Castiglione), grotte de Gudrone (Sorio), grotte des Paladini (Solaro) (VANOEL 1953a, 1960, 1968a; BERON 1972a); grotte Tavona di Nuaia No. 2 (Conca) (VANOEL 1960, 1968a; BERON 1972a); grotte Manuel-Ange (Lozzi), grotte Chevalier (Lano) (VANDEL 1968a; BERON 1972a); Canella bridge (S of Solenzara), banks of lower Gravona river (E of Ajaccio) (VANDEL 1960, 1968a).

DISTRIBUTION. — *Oritoniscus paganus* is endemic to Corsica.

REMARKS

On the basis of the presence or absence of the eye, VANDEL (1953a, 1960) divides the species into two subspecies: the nominal one, blind, spread throughout Corsica, and the subspecies *ocellatus*, limited to the northern peninsula. In the caves of Brando, Sisco and Corte, both subspecies seemed to be present (VANDEL 1968a).

The material examined here revealed the following important facts:

1. In the caves of Brando and Sisco (we have not studied material from the grotte de Corte) only the form *ocellatus* has been collected, and most probably this is the only species of the genus present in the whole Cap Corse peninsula;

Source : MNHN, Paris

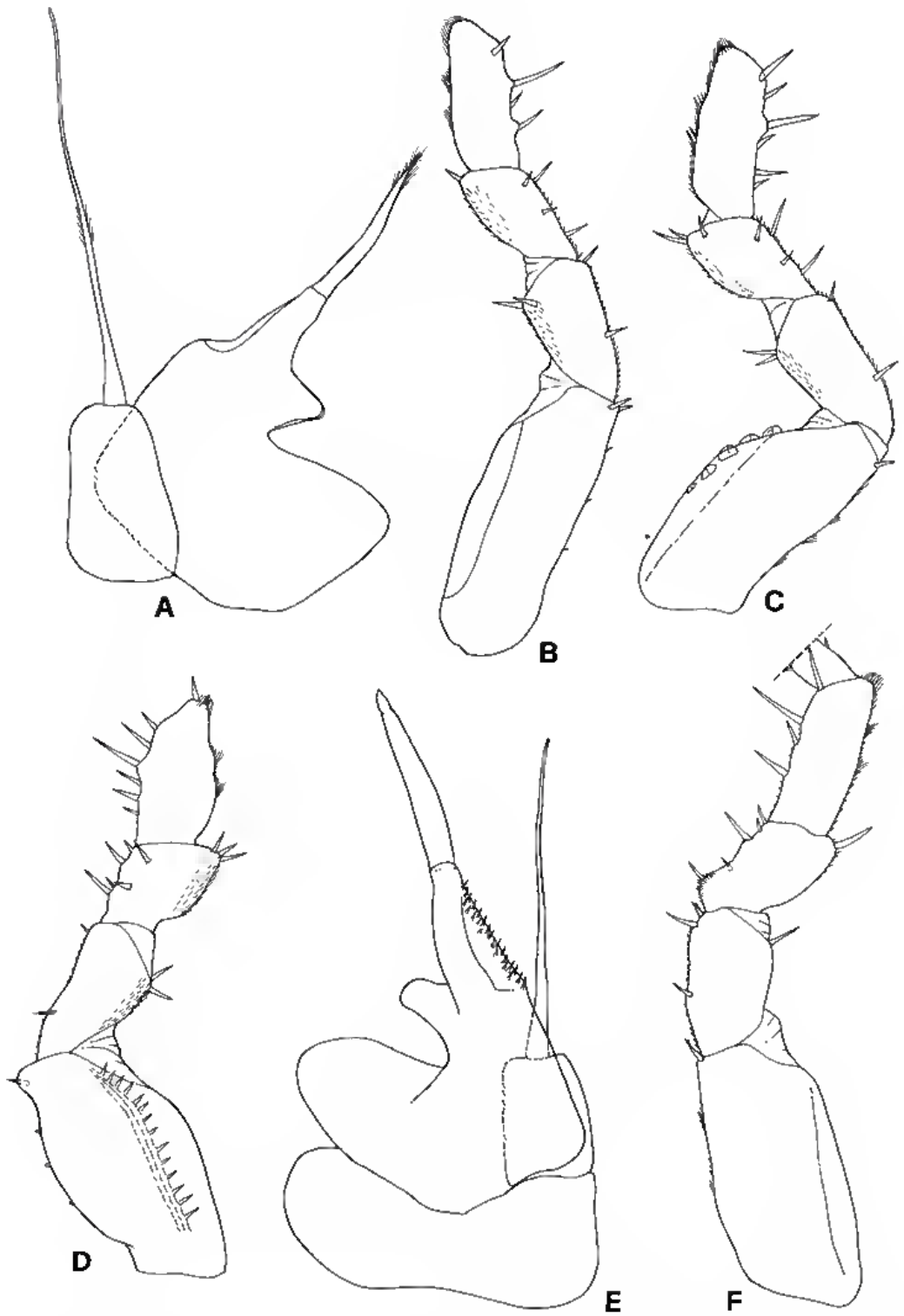


FIG. 6 — *Oritoniscus paganus*, ♂ from grotte de Pietralbello: A, pleopod 1; B, pereopod 5; C, pereopod 6; D, pereopod 7. *Oritoniscus ocellatus*, ♂ from grotte de Sisco: E, pleopod 1; F, pereopod 5.

Source : MNHN, Paris

2. VANDEL (1960) considers the specimens described by RACOVITZA (1908) to be immature stages of *O. paganus paganus*. VANDEL's opinion is certainly incorrect, since all the male specimens examined from the caves of Pietralbello (type locality), Sabara and Roumandella, up to 4 mm long and certainly adult, have pleopod 1 (Fig. 6A) as illustrated by RACOVITZA (1908) and VANDEL (1960, fig. 100B);

3. VANDEL (1953a) identifies *O. paganus* from the grotte des Tobi Pinnuti on the basis of a female and two juveniles. Some specimens with no trace of an eye, collected from the same cave, possess male characters (♂ 5.5 mm long) which differ from those of both *paganus* and *ocellatus* (see below).

Due to the consistent differences in male characters between *paganus* and *ocellatus*, we consider these two taxa to be distinct species. This conclusion has also been confirmed by a genetic analysis (COBOLLI SBORDONI *et al.* 1995). Most probably also the specimens from the grotte des Tobi Pinnuti belong to another distinct species, but we prefer not to nominate it because of the small amount of material examined.

The exact distribution within Corsica of *O. paganus* is not clear: it is certainly present in the four caves from which we examined specimens, while the records by VANDEL need confirmation after re-examination of the material studied by the French author.

Oritoniscus ocellatus Vandel, 1953
(Figs 6E, F, 7A, B, 9)

Oritoniscus paganus var. *ocellata* Vandel, 1953a: 159.

Oritoniscus paganus ocellatus; VANDEL 1960: 216, figs 99-100A, C; 1968a: 360; BERON 1972a: 10.

MATERIAL EXAMINED. — 3 ♂♂, 6 ♀♀, grotte de Sisco, leg. B. Lanza, 11.IV.1977; 8 ♂♂, 13 ♀♀, same locality, leg. W. Schawaller, 8.VIII.1980; 6 ♂♂, 19 ♀♀, same locality, leg. S. Taiti, 19.IV.1981; 3 ♂♂, 8 ♀♀, same locality, leg. S. Taiti, 21.V.1982; 14 ♂♂, 11 ♀♀, same locality, leg. S. Taiti and S. Campanelli, 13.X.1982; 4 ♂♂, 11 ♀♀, same locality, leg. S. Taiti and A. Poggesi, 27.VI.1984; 1 ♂, 1 ♀, same locality, leg. S. Taiti and S. Vanni, 6.III.1994; 2 ♂♂, 3 ♀♀, grotte de Brando, leg. S. Taiti and S. Campanelli, 13.X.1982; 2 ♀♀, same locality, leg. P. Magrini, 1.XI.1983; 1 ♂, 3 juvs, Camera (near Centuri), leg. S. Taiti, 18.IV.1981; 2 ♂♂, 1 ♀, near Camera, ilex grove, leg. S. Taiti and A. Poggesi, 19.VI.1984.

PREVIOUS RECORDS. — Grotte de Corte, grotte de Sisco, grotte de Brando (VANDEL 1953a, 1960, 1968a; BERON 1972a); Pino (VANDEL 1960, 1968a).

DISTRIBUTION. — This species occurs in the Cap Corse peninsula. A closely related form is present on the islands of Montecristo and Giannutri in the Tuscan Archipelago (TAITI & FERRARA 1995b).

REMARKS

Oritoniscus ocellatus differs from *O. paganus* in the presence of the eye, consisting of a single ommatidium, and the male modifications. In particular, the pereopod 5 merus shows a distinct setose swelling at the base (absent in *O. paganus*); the pereopod 7 basis is more swollen; the pleopod 1 exopod is clearly longer than the endopod (vice versa in *O. paganus*), with the basal lobe narrow and rounded (conspicuous and rectangular in *O. paganus*), the medial margin straight with many small spines in the distal part (it shows a step and no spines in *O. paganus*), and the terminal spine stouter with no distal setae.

Source : MNHN, Paris

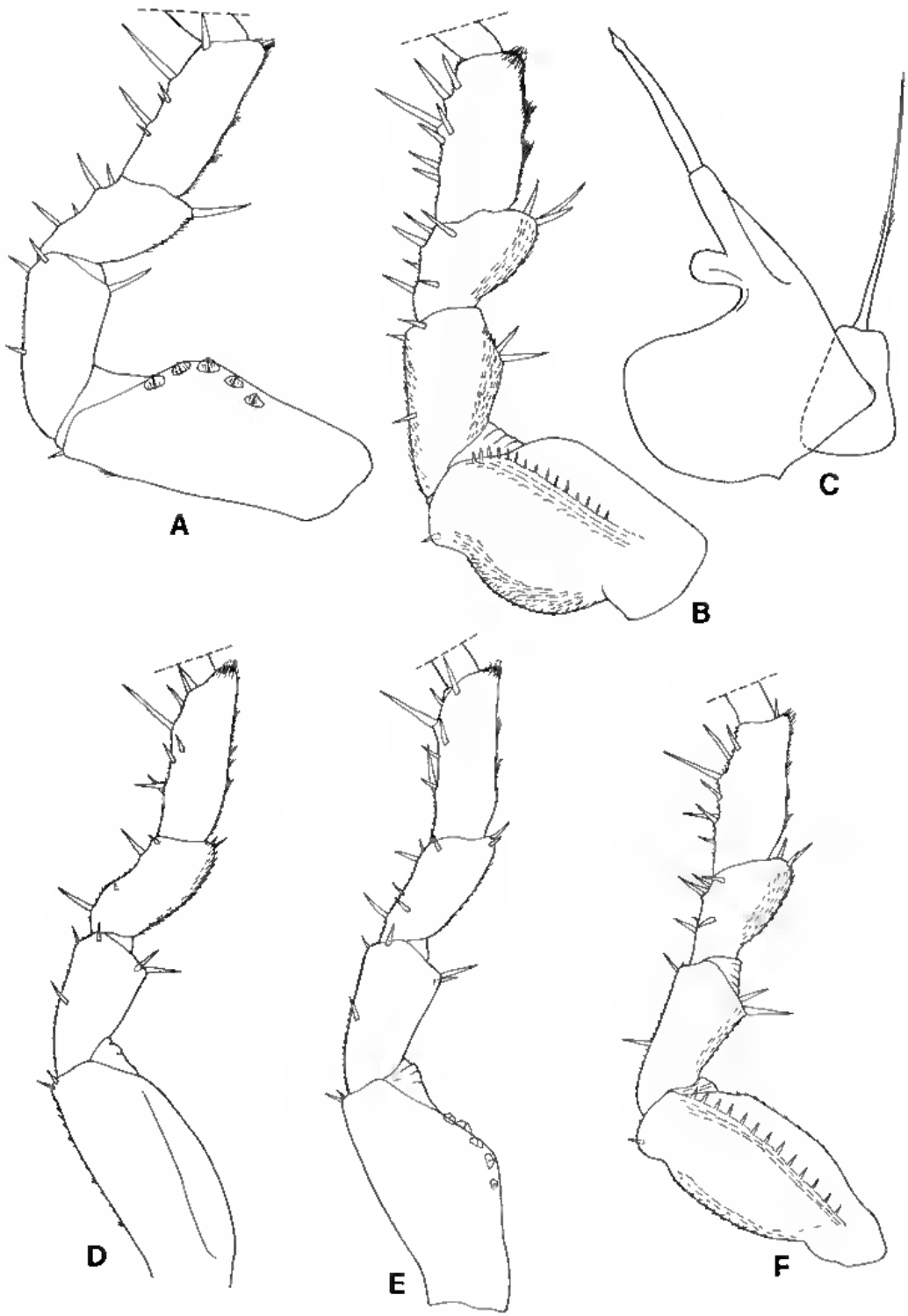


FIG. 7. — *Oritoniscus ocellatus*, ♂ from grotte de Sisco: A, pereopod 6; B, pereopod 7. *Oritoniscus* sp., ♂ from grotte des Tobi Pinnuti: C, pleopod 1; D, pereopod 5; E, pereopod 6; F, pereopod 7.

Source : MNHN, Paris

Oritoniscus sp.
(Figs 7C-F, 9)

Oritoniscus paganus; VANDEL 1953a: 159 (*partim*: grotte des Tobi Pinnuti).

Oritoniscus paganus paganus; VANDEL 1960: 216 (*partim*: grotte des Tobi Pinnuti); 1968a: 359 (*partim*: grotte des Tobi Pinnuti); BERON 1972a: 10 (*partim*: grotte des Tobi Pinnuti).

MATERIAL EXAMINED. — 1 ♂, 3 ♀♀, 5 juvs, grotte des Tobi Pinnuti (Sorio), leg. S. Taiti, 15.X.1982.

PREVIOUS RECORDS. — Grotte des Tobi Pinnuti (VANDEL 1953a, 1960, 1968a; BERON 1972a).

REMARKS

These specimens show clear differences in the male characters, particularly the shape of pleopod 1 (Fig. 7C), from both *O. paganus* and, to a lesser extent, *O. ocellatus*. They probably belong to a distinct species but more material is needed for a certain identification.

Oritoniscus punctatus n.sp.
(Figs 8, 9)

Oritoniscus punctatus (nomen nudum); FERRARA & TAITI 1984: 417.

MATERIAL EXAMINED. — 1 ♂ holotype (MZUF), 1 ♂ juv., 1 ♀ paratype (MNHN-Is4103), 1 ♀ paratype (MV), 1 ♀ juv. paratype (MZUF), Punta de la Parata (W of Ajaccio), under big stones on rocky cliff near sea, leg. S. Taiti, 14.V.1982.

ETYMOLOGY. — L. *punctatus* = having a point. The name refers to the distinct triangular point on the medial margin of the basal part of the male pleopod 1 exopod.

DESCRIPTION

Maximum length: ♂♂ and ♀♀, 4 mm.

Colourless body. Eye absent. Dorsum with distinct granulations, each bearing a large scale-spine on top. Antennule of three articles with 6-7 aesthetascs at the apex. Antenna with flagellum of five articles, the second of which with a row of 5-6 aesthetascs.

Male

Pereopods 1-6 without distinct modifications. Pereopod 7 basis with a deep depression on the distal part of the sternal margin. Pleopod 1 exopod with a basal part having a large concavity and a rounded lobe on the external margin, a distinct triangular point on the medial margin, and ending with a very long and strong distal spine; endopod with a rectangular basal part on which a long glabrous flagellum is inserted, not surpassing the tip of the exopod. Pleopod 2 exopod about three times as wide as long, with short posterior point apically rounded; endopod of two articles, the distal one pointed and slightly longer than the basal one.

Source : MNHN, Paris

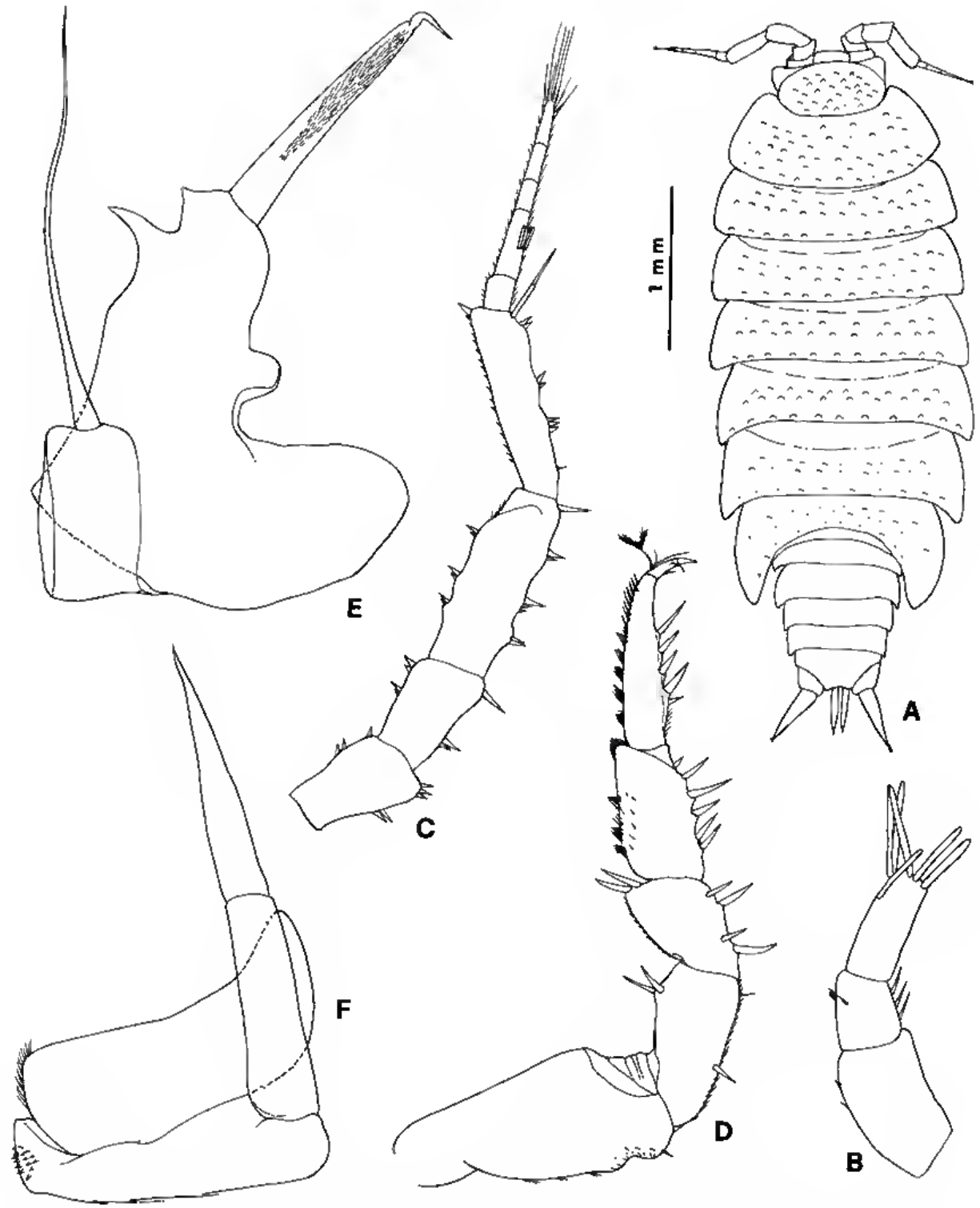


FIG. 8. — *Oritoniscus punctatus* n.sp., ♂: A, holotype, dorsal; B, antennule; C, antenna; D, pereopod 7; E, pleopod 1; F, pleopod 2.

Source : MNHN, Paris

REMARKS

The new species shows close affinities with *O. paganus* and *O. ocellatus*. It is easily distinguishable from both in having dorsal granulations and in the modifications of the male pereopod 7 and pleopod 1, particularly the shape of the exopod with a distinct acute point on the medial margin. This last character is absent in all the species of the *paganus*-group.

Genus **TRICHONISCUS** Brandt, 1833

Trichoniscus pusillus provisorius Racovitza, 1908

Trichoniscus pusillus provisorius; VANDEL 1954a: 73; 1960: 321, figs 30, 150.2.

MATERIAL EXAMINED. — Many ♂♂ and ♀♀ collected from the following localities: Barcaggio (Cap Corse); Minervio (S of Pino); Carbonacce (S of Luri); marine de Gioltani (between Nonza and Centuri-Port); Ponticello (near Pietracorbara); marine de Pietracorbara; Nonza; near grotte de Brando; Lavasina (S of Brando); col de Teghime (W of Bastia); Oletta; Bevinco river valley, below col de S. Stefano; Urtaca; 2 km SW of Ponte Novu (Golo river valley); Asco river valley, S of Mollifao; 3 km S of Ponte Leccia, left bank of Golo river; forêt de Bonifato (S of Calvi); Punta di Chiarsgioli (Monte San Petrone); Francardo; near Lano (NW of Corte); near Siazzona; Corte; near Albertacce (forêt de Valdo-Niello); col de Vergio (NE of Evisa); Porto; SSE of Evisa; Tavignano river valley, between Volta and Scandulaie (NW of Aléria); col de Vizzavona; col de Verde (S of Ghisoni); 1 km E of Tolla (Prunelli river valley); between Cauro and Bocca San Giorgio (E of Ajaccio); 3 km N of col de la Vaccia (N of Aullène); col de Bavella; 2 km NW of Aullène; Casalabriva (N of Propriano); below chapelle Pianelli, between Casalabriva and Olmeto; Golfo di Sogno (N of Porto-Vecchio); Monte Rosso (SE of Sartène); Orasi (S of Sartène); Tizzano (SW of Sartène).

PREVIOUS RECORDS. — All Corsica (VANDEL 1954a, 1960).

DISTRIBUTION. — *Trichoniscus pusillus provisorius* is recorded from France, Great Britain, Ireland, Denmark, Poland, Spain, Switzerland, Italy, Turkey, Lebanon and Algeria. It has been introduced also to the Azores and Newfoundland.

Trichoniscus pygmaeus Sars, 1899

Trichoniscus pygmaeus; VANDEL 1954a: 73; 1960: 325, figs 153-154.

MATERIAL EXAMINED. — 1 ♂, between Pietrosella and Fogolina, SE of Porticcio (Ajaccio), ilex and arbutus wood, leg. S. Taiti and S. Campanelli, 21.X.1982.

PREVIOUS RECORDS. — Corsica (VANDEL 1954a, 1960).

DISTRIBUTION. — This is a widespread species known from Europe (except Portugal and the Balkans), Morocco, Newfoundland and the USA.

Trichoniscus fragilis Racovitza, 1908
(Fig. 9)

Trichoniscus fragilis; VANDEL 1954a: 73; 1960: 333, fig. 158; 1968a: 356; BERON 1972a: 11.

Source : MNHN, Paris

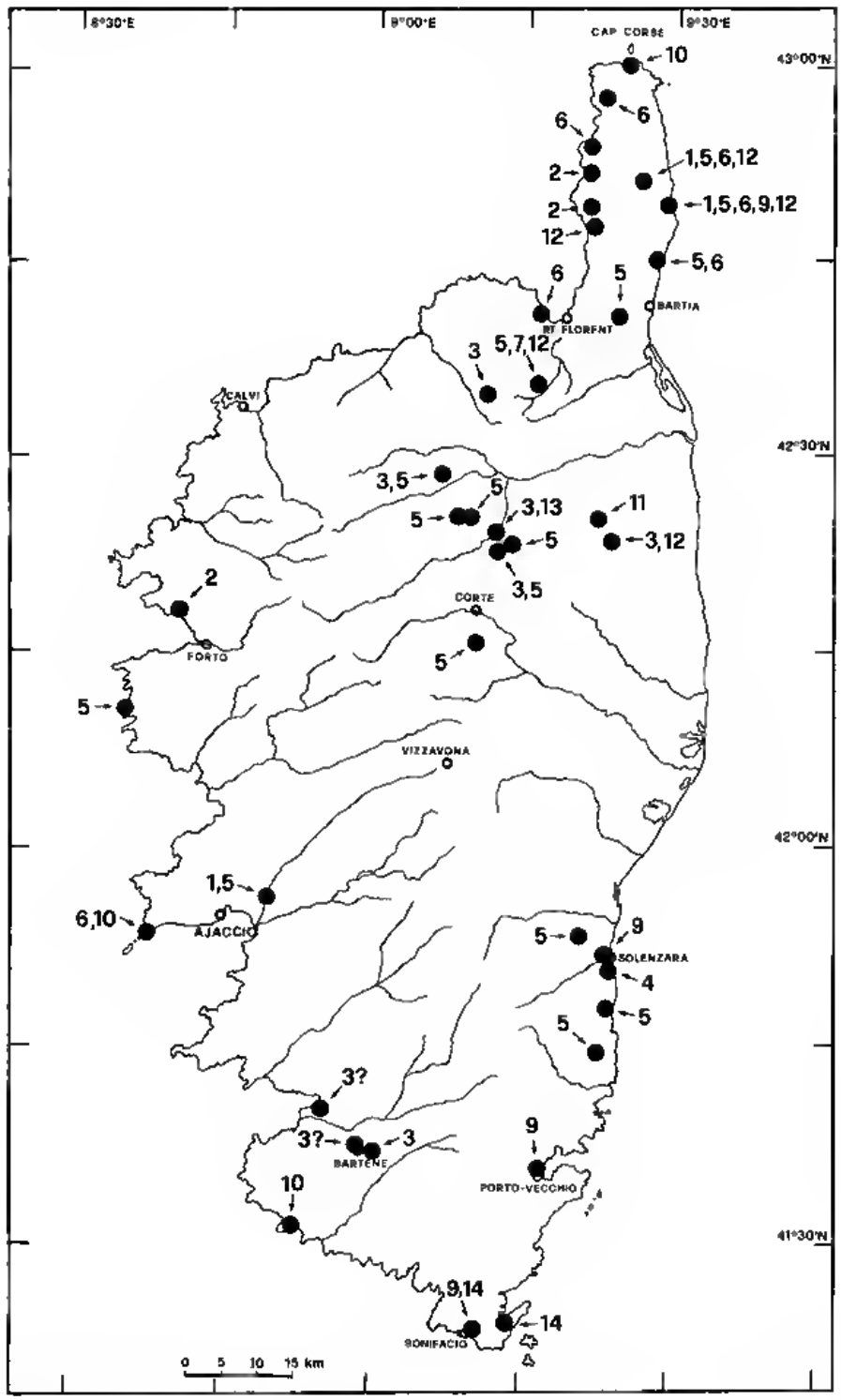


FIG. 9. — Distribution in Corsica of Trichoniscidae species (except *Trichoniscus pusillus provisorius*, *T. pygmaeus* and *Haplophthalmus danicus*): 1, *Finaloniscus briani*; 2, *F. franciscoloi*; 3, *Nesiotoniscus corsicus*; 4, *N. racovitzai*; 5, *Ortoniscus pagonus*; 6, *O. ocellatus*; 7, *Ortoniscus* sp.; 8, *O. punctatus*; 9, *Trichoniscus fragilis*; 10, *T. halophilus*; 11, *T. pedronensis*; 12, *Cyrnoniscus remyi*; 13, *Carloniscus dollfusi*; 14, *Buddelundiella cotarociae*.

Source : MNHN, Paris

MATERIAL EXAMINED. — 8 ♂♂, 8 ♀♀, entrance of the grotte de Sisco, leg. S. Taiti, 19.IV.1981; 4 ♂♂, 8 ♀♀, same locality, leg. S. Taiti and S. Vanni, 8.III.1994; 3 ♂♂, 3 ♀♀, Phare de Fornali (W of St-Florent), leg. S. Taiti, 17.VII.1978.

PREVIOUS RECORDS. — Sisco, Solenzara, Porto-Vecchio, Bonifacio (VANDEL 1960); grotte de St-Barthélémy (Bonifacio) (VANDEL 1968a; BERON 1972a); grotte de Sisco (BERON 1972a).

DISTRIBUTION. — Atlantic and Mediterranean coasts of France, Corsica, Tuscany, southern Italy, Crete and Algeria.

Trichoniscus halophilus Vandel, 1951
(Fig. 9)

MATERIAL EXAMINED. — 1 ♂, Barcaggio, Cap Corse, leg. S. Taiti and S. Campanelli, 14.X.1982; 2 ♂♂, 7 ♀♀, same locality, leg. S. Taiti and A. Poggesi, 19.VI.1984; 2 ♀♀, Punta de la Parata (W of Ajaccio), leg. S. Taiti and S. Vanni, 8.III.1994; 1 ♂, 6 ♀♀, Punta di e Botte di Tizzano (SW of Sartène), small stream near sea, leg. S. Taiti, 15.V.1982.

DISTRIBUTION. — This species is known from some French Mediterranean islands, Corsica, Sardinia, Tuscany, Sicily, Pantelleria Island, Lampedusa Island and Malta. In Morocco it has been recorded from a cave near Taza (VANDEL 1955).

Trichoniscus pedronensis Vandel, 1947
(Fig. 9)

Trichoniscus pedronensis Vandel, 1947: 49, figs 13-14; 1954a: 73; 1960: 332, fig. 157.

MATERIAL EXAMINED. — 2 ♂♂, 2 ♀♀ (syntypes), Monte San Pedrone [= San Petrone], 1600 m, versant est, dans la hêtraie sous les pierres, leg. P. Remy, 26.VIII.1942 (MNHN).

PREVIOUS RECORDS. — Monte San Petrone (VANDEL 1947, 1960).

DISTRIBUTION. — Known only from the type locality.

REMARKS

Investigations carried out in the beech woods of Monte San Petrone revealed no specimens that could be referred to this species. We re-examined the type material studied by VANDEL, but unfortunately pereopods 7 and pleopods 1 and 2 of both males are preserved in micropreparations which have deteriorated with age, so that we are not able to provide new illustrations of the sexual characters of this species.

Genus **HAPLOPHTHALMUS** Schoebl, 1861

Haplophthalmus danicus Budde-Lund, 1885

Haplophthalmus danicus; VANDEL 1954a: 73; 1960: 362, fig. 172.

MATERIAL EXAMINED. — Many ♂♂ and ♀♀ collected from the following localities: near marine de Giottani and near grotte de Brando (Cap Corse peninsula); Folelli, along Fium Alto; between Stazzona and the Eaux

Source : MNHN, Paris

d'Orezza; 3 km S of Ponte Leccia, along left bank of Golo river; Francardo, right bank of Golo river, near a spring.

PREVIOUS RECORDS. — Corsica, very common (VANDEL 1960).

DISTRIBUTION. — This species is known from all Europe, northern Africa, Asia Minor, St Helena Island, most of North America, Hawaii and Japan.

Genus **CYRNONISCUS** Vandel, 1953

Cyrnoniscus remyi Vandel, 1953
(Fig. 9)

Cyrnoniscus remyi Vandel, 1953a: 163, figs 5-6; 1954a: 73; 1960: 394, figs 190-191; 1968a: 360; BERON 1972a: 11; 1972b: 809.

MATERIAL EXAMINED. — 4 ♂♂, 6 ♀♀, grotte de Corte (Pietracorbara), leg. P. Beron, 27.XI.1967; 1 ♀, grotte de Sisco, leg. S. Taiti and S. Campanelli, 13.X.1982; 2 ♀♀, same locality, leg. W. Schawaller, 8.VIII.1980; 1 ♀, same locality, leg. S. Taiti and A. Poggesi, 27.VI.1984; 2 ♂♂, same locality, leg. S. Taiti and S. Vanni, 6.III.1994; 2 ♀♀, same locality, leg. S. Taiti, S. Vanni and A. M. Nistri, 3.IV.1995; 1 ♀, Nonza, near cemetery, leg. S. Taiti and A. Poggesi, 24.VI.1984; 1 ♂, 1 ♀, grotte des Tobi Pinnuti (Sorio), leg. S. Taiti, 15.X.1982; 14 ♀♀, 1 juv., 1.6 km from Stazzona, near road to the Eaux d'Orezza, leg. S. Taiti and A. Poggesi, 20.VI.1984.

PREVIOUS RECORDS. — Grotte de Corte (Pietracorbara), grotte de Gudrone (Sorio) (VANDEL 1953a, 1960, 1968a; BERON 1972a); grotte de Sisco, grotte de Ostriago (Pietracorbara) (VANOEL 1968a; BERON 1972a).

DISTRIBUTION. — *Cyrnoniscus remyi*, the sole species in the genus, is endemic to Corsica.

Genus **CARLONISCUS** Verhoeff, 1936

Carloniscus dollfusi (Carl, 1908)
(Fig. 9)

Carloniscus Dollfusi; VANDEL 1954a: 73.
Carloniscus dollfusi; VANDEL 1960: 388, figs 187A, 189.

RECORDS. — Francardo, right bank of Golo river (VANDEL 1960).

DISTRIBUTION. — This species occurs in the French Alps and Corsica.

REMARKS

VANDEL's record of this species on the right bank of the Golo river at Francardo needs to be confirmed. It was based on a single female specimen and several recent investigations in the same locality aimed at collecting this species have not been successful. It could be a matter of an occasional introduction: in fact, another species (*Haplophthalmus danicus*), certainly introduced, is abundant in that area.

Source : MNHN, Paris

Genus **BUDDELUNDIELLA** Silvestri, 1897

Buddelundiella cataractae Verhoeff, 1930
(Fig. 9)

Buddelundiella borgensis; VANDEL 1954a: 73.
Buddelundiella cataractae; VANDEL 1960: 410, figs 198-201.

RECORDS. — Bonifacio, Gurgazo (VANDEL 1960).

DISTRIBUTION. — This species has a widespread distribution in Europe.

Undetermined family
Genus **BUCHNERILLO** Verhoeff, 1942

Buchnerillo litoralis Verhoeff, 1942

Lereboulletia littoralis; VANDEL 1945: 104, figs V-XVI.
Buchnerillo littoralis; VANDEL 1954a: 73; 1960: 400, figs 195-197.

MATERIAL EXAMINED. — 1 ♂, 2 ♀♀, 1 juv., Barcaggio (Cap Corse), leg. S. Taiti and S. Campanelli, 14.X.1982; 1 ♂, 9 ♀♀, same locality, leg. S. Taiti and A. Poggesi, 19.VI.1984; 1 ♂, 7 ♀♀, 2 juvs, l'Île-Rousse, leg. S. Taiti, 16.VII.1978; I ♂, Punta de la Parata (W of Ajaccio), leg. S. Taiti, 14.V.1982.

PREVIOUS RECORDS. — Marine de Sisco (VANDEL 1945, 1960).

DISTRIBUTION. — It is known from the coasts of Madeira Island, Provence, Corsica, Sardinia, Tuscany, Ischia Island, Aegadean islands, Sicily and Malta.

Family STENONISCIDAE
Genus **STENONISCUS** Aubert & Dollfus, 1890

Stenoniscus pleonalis Aubert & Dollfus, 1890

Stenoniscus pleonalis; VANDEL 1944b: 24; 1954a: 73.
Stenoniscus pleonalis pleonalis; VANDEL 1962: 425, figs 206, 208-210; BERON 1972a: 11.

RECOROS. — Lavasina (S of Brando), marine de Sisco (VANOEL 1944b, 1962); grotte de Sdragonato (Bonifacio) (BERON 1972a).

DISTRIBUTION. — This species occurs on the northern coasts of the Mediterranean, from France to Greece, and Madeira Island. VANDEL (1968b) reported this species in the Galapagos, but this record needs confirmation.

REMARKS

VANDEL (1962) considers *S. carinatus* Silvestri, 1897 to be a subspecies of *S. pleonalis*. However, it is certain that the two taxa are distinct species (CARUSO 1976; TAITI & FERRARA 1980). Without re-examination, it is not possible to define to which of the two species belong

Source : MNHN, Paris

the specimens from Corsica recorded in the literature as *S. pleonalis*. However, it is very probable that both species are present in Corsica, as in the Tuscan Archipelago.

Stenoniscus carinatus Silvestri, 1897

Stenoniscus carinatus; LANZA & POGGESI 1986: 121, 178.

MATERIAL EXAMINED. — Many ♂♂ and ♀♀, Punta de la Parata (W of Ajaccio), leg. S. Taiti and S. Vanni, 8.III.1994; 3 ♂♂, 17 ♀♀, Capo Pertusato (SE of Bonifacio), leg. S. Taiti and S. Campanelli, 19.X.1982; 2 ♂♂, île Pietricaggiosa (Cerbicale), leg. S. Taiti and S. Campanelli, 17.V.1982.

PREVIOUS RECORDS. — Phare de Pertusato and île Pietricaggiosa (LANZA & POGGESI 1986).

DISTRIBUTION. — This species is known from Tenerife (Canaries), Portugal, Corsica, Sardinia, the Tuscan Archipelago, Sicily and surrounding islands (Ustica, Pantelleria, Aegadean and Pelagean islands), Malta and the coasts of the northern Adriatic. Most probably the records of *S. pleonalis* by SCHULTZ (1972) from Bermuda islands, and PAOLETTI & STINNER (1989) from Florida, belong to *S. carinatus*; this species is certainly present in Florida (many ♂♂ and ♀♀, Key West and Long Key, leg. S. Taiti, 15-16.XII.1984).

Family SCYPHACIDAE
Genus **ARMADILLONISCUS** Uljanin, 1875

Armadilloniscus candidus Budde-Lund, 1885
(Fig. 10A, B)

Armadilloniscus candidus; VANDEL 1954a: 74; 1962: 472, figs 234-235.

MATERIAL EXAMINED. — 1 ♂, 2 ♀♀, Tollare (Cap Corse), leg. S. Taiti, 18.IV.1981; 1 ♂, 1 ♀, l'Île-Rousse, leg. S. Taiti, 16.VII.1978; 7 ♂♂, 32 ♀♀, Punta de la Parata (W of Ajaccio), leg. S. Taiti, 14.V.1982; 1 ♂, 1 ♀, Fautea (between Solenzara and Porto-Vecchio), leg. S. Taiti, 17.V.1982.

PREVIOUS RECORDS. — Sisco (VANDEL 1962).

DISTRIBUTION. — This species occurs on the coasts of southern France, Corsica, Sardinia, Tuscany, Algeria, Tunisia, Malta and the Azores.

Armadilloniscus ellipticus (Harger, 1878)
(Fig. 10C, D)

MATERIAL EXAMINED. — 24 ♂♂, 37 ♀♀, Barcaggio (Cap Corse), leg. S. Taiti and S. Campanelli, 14.X.1982; 3 ♂♂, 2 ♀♀, same locality, leg. S. Taiti and A. Poggesi, 19.VI.1984.

DISTRIBUTION. — *Armadilloniscus ellipticus* is known from the Atlantic coasts of North America, the coasts of the Mediterranean, the Azores, Madeira Island, Madagascar, Malaysia, Hong Kong, Korea and Hawaiian islands (TAITI & FERRARA 1989b; GARTHWAITE *et al.* 1992).

Source : MNHN, Paris

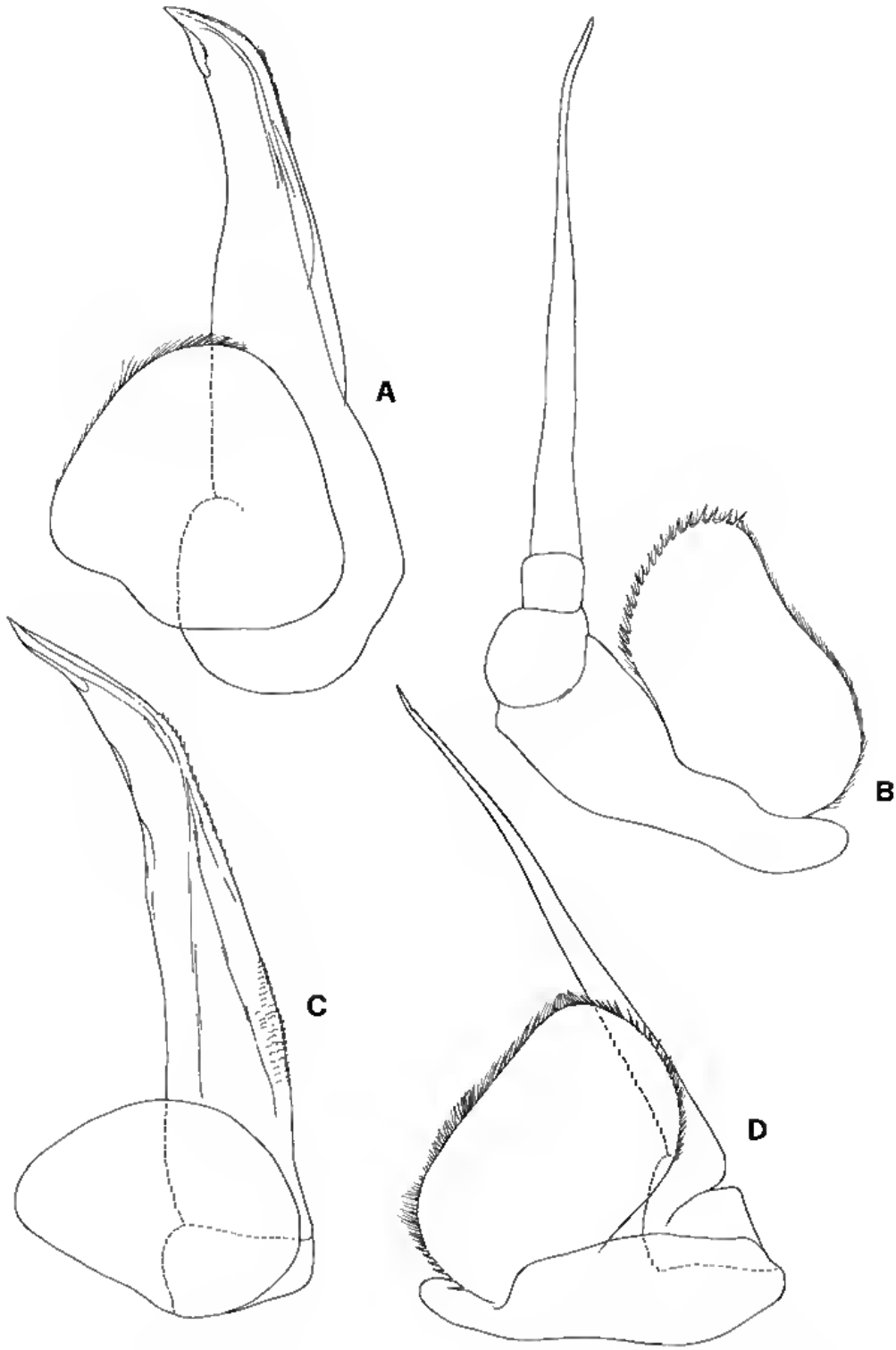


FIG. 10. — *Armadilloniscus candidus*, ♂: A, pleopod 1; B, pleopod 2. *Armadillomscus ellipticus*, ♂: C, pleopod 1; D, pleopod 2.

Source : MNHN, Paris

REMARKS

The synonymy of *Armadilloniscus litoralis* Budde-Lund, 1885 with *A. ellipticus* has been proved recently by GARTHWAITE *et al.* (1992) on the basis of both morphological and genetic data.

Family HALOPHILOSCIIDAE
Genus **HALOPHILOSCIA** Verhoeff, 1908

Halophiloscia couchii (Kinahan, 1858)

Philoscia Couchii; DOLLFUS 1897: 72; ARCANGELI 1925: 50.
Philoscia Couchi; DOLLFUS 1899: 207.
Halophiloscia Couchi; VANDEL 1954a: 74.
Halophiloscia (Halophiloscia) couchi; VANDEL 1962: 477, figs 237-238.

MATERIAL EXAMINED. — Many ♂♂ and ♀♀ collected from the following localities: Barcaggio and Tollare (Cap Corse); marine de Sisco; Phare de Fornali (W of St-Florent); anse de Faggiola (désert des Agriates); Punta de la Parata (W of Ajaccio); Golfo di Sogno (N of Porto-Vecchio).

PREVIOUS RECORDS. — Bastia and Porto-Vecchio (DOLLFUS 1897, 1899); Etang de Biguglia (DOLLFUS 1899).

DISTRIBUTION. — This widespread species populates all the coasts of the Mediterranean, the Atlantic coasts of Europe and Africa as far south as Dakar, the Azores, Canaries, Madeira and Cape Verde. It has also been introduced to Virginia, Bermuda, Argentina and Western Australia.

Halophiloscia hirsuta Verhoeff, 1928

Halophiloscia hirsuta; VANDEL 1954a: 74; LANZA & POGGESI 1986: 120, 176, 178, 179.
Halophiloscia (Halophiloscia) hirsuta; VANDEL 1962: 483, figs 241-242; BERON 1972a: 12.
Halophiloscia sp.; Beaucournu, 1967: 562.

MATERIAL EXAMINED. — Many ♂♂ and ♀♀ collected from the following localities: Tollare (Cap Corse); marine de Giottani (between Nonza and Centuri-Port); entrance of the grotte de Sisco; anse de Faggiola (désert des Agriates); Punta de la Parata (W of Ajaccio); Tizzano and environs (SW of Sartène); Capo Pertusato (SE of Bonifacio); île de la Giraglia; îlot Intermediaire (Finocchiarola, E of Cap Corse); île Pietricaggiosa (Cerbicale); îlot La Folaca (near Palombaggia, SE of Porto-Vecchio); îlot Sperduto Piccolo (E of Île Cavallo); îlot Cala di u Ghiunco (île Lavezzi).

PREVIOUS RECORDS. — Grotte des Pigeons (Sagone), grotte de Saragonato (Bonifacio) (BERON 1972a); Corsica (VANOEL 1954a, 1962); îlot Intermediaire (Finocchiarola), île Pietricaggiosa (Cerbicale), îlot Toro Grande, îlot La Folaca (LANZA & POGGESI 1986).

DISTRIBUTION. — This species is known from the north-central coasts of the Mediterranean, from France to Greece.

Halophiloscia ischiana Verhoeff, 1933

MATERIAL EXAMINED. — 3 ♂♂, 6 ♀♀, Golfo di Sogno (N of Porto-Vecchio), leg. S. Taiti, 13.IV.1981.

Source : MNHN, Paris

DISTRIBUTION. — This species was previously recorded from southern France, Sardinia, Tuscany (Giglio Island and Monte Argentario promontory), Campania (Ischia Island and Sorrento), and the Balearic islands (Menorca Island).

Halophiloscia tyrrhena Verhoeff, 1928

MATERIAL EXAMINED. — 1 ♀, Barcaggio (Cap Corse), leg. S. Taiti and S. Campanelli, 14.X.1982; 1 ♂, 3 ♀♀, marine de Sisco, leg. S. Taiti and S. Campanelli, 12.X.1982; 3 ♂♂, 3 ♀♀, Punta de la Parata (W of Ajaccio), leg. S. Taiti and S. Vanni, 8.III.1994.

DISTRIBUTION. — It is known from the Mediterranean coasts of France, Corsica, Sardinia, Liguria, Tuscany (Gorgona and Elba islands, promontories of Monte Massoncello, Uccellina and Monte Argentario).

Genus **STENOPHILOSCIA** Verhoeff, 1908

Stenophiloscia zosterae Verhoeff, 1928

MATERIAL EXAMINED. — Many ♂♂ and ♀♀ collected from the following localities: Barcaggio (Cap Corse); marine de Pietracorbara; marine de Sisco; l'Île-Rousse; Calzarello and environs (E of Ghisonaccia).

DISTRIBUTION. — Known from southern France, Corsica, Sardinia, Liguria, Tuscany, Sicily and surrounding islands (Ustica, Aeolian islands, Pantelleria, Pelagean islands), Malta, Dalmatia and Greece.

Family PHILOSCIIDAE
Genus **CHAETOPHILOSCIA** Verhoeff, 1908

Chaetophiloscia elongata (Dollfus, 1884)

Philoscia pulchella Budde-Lund, 1885: 215.
Philoscia elongata; SCHARFF 1894: 163; DOLLFUS 1897: 95; 1899: 198; Arcangeli, 1925: 48.
Chaetophiloscia elongata; VANDEL 1954a: 74.

MATERIAL EXAMINED. — Many ♂♂ and ♀♀ collected from the following localities: Barcaggio and Tollare (Cap Corse); Centuri-Port; near Meria; marine de Pietracorbara; marine de Giottani (between Nonza and Centuri-Port); Sta Catterina de Sisco; between Ogliastro and Lainosa (N of Nonza); Nonza; near Crosciano, along Sisco river; near Erbalunga; near grotte de Brando; col de Teghime (W of Bastia); désert des Agriates; plage d'Ostriconi (NE of Lozari); between Casatorra and Oletta; Asco river valley; Folelli, along Fium Alto; Prunete (E of Cervione); plage de Caspio (NW of Porto); Sollacaro (N of Propriano); near Propriano; Fautea (between Solenzara and Porto Vecchio); Lovo Santo, swamp at mouth of Cavo river; source de Caldane (NE of Sartène); Golfo di Sogno (N of Porto-Vecchio); Monte Rosso (SE of Sartène); Tizzano and baie d'Avena (SW of Sartène); golfe de Sant'Amanza (NE of Bonifacio).

PREVIOUS RECORDS. — Ajaccio, Bastia (SCHARFF 1894, DOLLFUS 1899); Sartène, Bonifacio (DOLLFUS 1899).

DISTRIBUTION. — This species is widespread in the lands encompassing the Mediterranean Sea.

Chaetophiloscia sicula Verhoeff, 1908

Chaetophiloscia sicula; VANDEL 1954a: 74; 1962: 496, fig. 247.

Source : MNHN, Paris

MATERIAL EXAMINED. — Many ♂♂ and ♀♀ collected from the following localities: Barcaggio (Cap Corse); Centuri-Port; between Macinaggio and Meria; Guado Grande (N of Nonza); near grotte de Brando; Cardo (W of Bastia); near San Martino-di-Lota; Bastia; défilé de Lancone (W of Casatorra); Asco river valley; Francardo (N of Corte); near Propriano; île de la Giraglia.

PREVIOUS RECORDS. — Corsica (VANOEL 1954a, 1962).

DISTRIBUTION. — Known from Menorca Island, southern France, Corsica, all the Italian peninsula, the Tuscan Archipelago (islands of Gorgona, Elba, Palmaiola, Giglio and Giannutri), Ischia Island, Sicily and Greece.

Chaetophiloscia cellaria (Dollfus, 1884)

Philoscia cellaria; DOLLFUS 1897: 91.

Chaetophiloscia cellaria; REMY 1950: 9; VANDEL 1953a: 163; 1954a: 74; 1962: 499, fig. 248; BERON 1972a: 12; SCHMALFUSS 1990: 170.

MATERIAL EXAMINED. — Many ♂♂ and ♀♀ collected from the following localities: between Macinaggio and Meria; marine de Giottani (between Nonza and Centuri-Port); grotte de Sisco; grotte de Brando and environs; Miomo; Cardo (W of Bastia); île de la Giraglia.

PREVIOUS RECORDS. — Bonifacio (caves) (DOLLFUS 1897, VANOEL 1962); grotte de Brando (REMY 1950; VANDEL 1953a, 1962; BERON 1972a); grotte de St François (Bonifacio) (VANOEL 1953a; BERON 1972a); grotte de Sisco (VANDEL 1962; BERON 1972a); cave N of Bastia (SCHMALFUSS 1990).

DISTRIBUTION. — Widespread in the northern Mediterranean region, from Spain to Lebanon (SCHMALFUSS 1991).

Genus **CTENOSCIA** Verhoeff, 1928

Ctenoscia dorsalis Verhoeff, 1928

MATERIAL EXAMINED. — Many ♂♂ and ♀♀, Tollare (Cap Corse), leg. S. Taiti, 18.IV.1981; 1 ♂, 2 ♀♀, same locality, leg. S. Taiti and A. Poggesi, 19.VI.1984.

DISTRIBUTION. — This species is known from western Spain, Corsica, Sardinia, Liguria, Sicily and surrounding islands (Aeolian and Aegadean islands, Pantelleria and Pelagean islands), and Malta.

Ctenoscia minima (Dollfus, 1892)

Ctenoscia minima; Beron, 1972a: 11.

RECORDS. — Grotte de Sisco (BERON 1972a).

DISTRIBUTION. — Portugal, Spain, Menorca Island, La Galite Archipelago and Corsica (?).

REMARKS

Ctenoscia minima differs from *C. dorsalis* in having the male pleopod 1 endopod bent outwards instead of straight. The record of this species by BERON (1972a) is doubtful, since it is based on a single specimen with no indication of the sex. Most probably it refers to *C. dorsalis*.

Source : MNHN, Paris

Genus **PHILOSCIA** Latreille, 1804

Philoscia affinis Verhoeff, 1908

Philoscia muscorum; SCHARFF 1894: 163; DOLLFUS 1899: 190; ARCANGELI 1925: 47; VERHOEFF 1926: 263.

Philoscia affinis; VANDEL 1954a: 74; 1962: 511, figs 254C, 255; BERON 1972a: 12.

MATERIAL EXAMINED. — Many ♂♂ and ♀♀ collected from the following localities: Barcaggio and Tollare (Cap Corse); Centuri-Port; Camera (near Centuri); Rogliano; between Macinaggio and Meria; Morsiglia; 2 km SE of col de Ste-Lucie (between Pino and Luri); 2 km E of Luri; Carbonacce (S of Luri); marine de Pietracorbara; Ponticello (near Pietracorbara); Selmacci (SW of Pietracorbara); St-Léonard (W of marine de Pietracorbara); Ogliastro (N of Nonza); Guado Grande (N of Nonza); near Crosciano along Sisco river; marine de Sisco; Nonza; near Erbalunga; near grotte de Brando; Sta Maria-di-Lota; Cardo (W of Bastia); désert des Agriates; Casta (SW of St-Florent); Olmeta-di-Tuda; col de S. Stefano (S of Olmeta-di-Tuda); défilé de Lancone; 1 km N of San-Gavino-di-Tenda; plage d'Ostriconi (NE of Lozari); Urtaca; near Murato; 1 km W of Altiani (SE of Speloncato); near grotte de Pietralbello (Moltifao); Asco river valley; 2 km SW of Ponte Nuovo along Golo river; 3 km S of Ponte Leccia; forêt de Bonifato (SE of Calvi); Francardo (N of Corte); Lano (NW of Corte); Punta di Chiarsgioli (Monte San Petrone); near the Eaux d'Orezza; near Stazzona; 2 km S of Carticasi; Prunete (E of Cervione); 2 km S of Corte; SE of Porto; near Cargèse; col de Vizzavona; 7 km SSW of Ghisoni; 1 km E of Tolla (Prunelli river valley); between Alza and Argiavara (col de Bavella); col de Bavella; between col de Bavella and Punta Velaco; 2 km N of Aullène; between col de St-Eustache and col de Tana (W of Aullène); near Zonza; below chapelle Pianelli, between Casalabriva and Olmeto; Taglio Rosso (Ste-Lucie-de-Porto-Vecchio); Lovo Santo, swamp at mouth of Cavo river; near Propriano; 2 km W of Orone (W de l'Ospedale); source de Caldane (NE of Sartène); Golfo di Sogno (N of Porto-Vecchio); Tizzano and baie d'Avena (SW of Sartène); golfe de Sant'Amanza (NE of Bonifacio); Bonifacio; Capo Pertusato (SE of Bonifacio).

PREVIOUS RECORDS. — Ajaccio (SCHARFF 1894); Bastia (SCHARFF 1894, DOLLFUS 1899, ARCANGELI 1925); St Florent (SCHARFF 1894); Corsica, very common (VANDEL 1962); grotte de Grottone (Lama) (BERON 1972a).

DISTRIBUTION. — This widespread species has been recorded from Italy, Slovenia, Croatia, Germany, France, northern Spain, Algeria, and perhaps Tunisia (VANDEL 1962). It occurs on all the Tyrrhenian islands and Malta.

REMARKS

According to VANDEL (1954a, 1962) the records from Corsica of *P. muscorum* (Scopoli, 1763) most probably refer to *P. affinis*. Also in our opinion this is the only species of the genus present in Corsica, as shown by the abundant material examined. Thus, *P. muscorum* is considered not to belong to the Corsican fauna.

Genus **TIROLOSCIA** Verhoeff, 1926

Tiroloscia corsica corsica (Dollfus, 1888)

Philoscia corsica Dollfus, 1888: 10, figs 1-14; SCHARFF 1894: 163; DOLLFUS 1897: 94; 1899: 207; ARCANGELI 1925: 47.

Philoscia (Tiroloscia) corsica; ARCANGELI 1950: 130; VANDEL 1954a: 74.

Tiroloscia corsica; VANDEL 1962: 518, fig. 256.

MATERIAL EXAMINED. — Many ♂♂ and ♀♀ collected from the following localities: Barcaggio and Tollare (Cap Corse); marine de Giottani (between Nonza and Centuri-Port); Sta Catterina, N of marine de Sisco; col de

Source : MNHN, Paris

S. Stefano (S of Olmeta-di-Tuda); entrance of the grotte de Grottone, near Lama; 1 km W of Altiani (SE of Speloncato); between Barchetta and Casamozza on the left bank of Golo river; 2 km SW of Ponte Nuovo (Golo river valley); Asco river valley, NW of Ponte Leccia; S of Moltifao (Asco river valley); forêt de Bonifato; near grotte de Sabara (near Castiglione); Punta di Chiarsgioli (Monte San Petrone); Francardo; Albertacce (Golo river valley); col de Vergio (NE of Evisa); forêt de Valdo-Niello; forêt de la Restonica; near Porto; SSE of Evisa, along Porto river; near col de Sevi (SE of Evisa); Venaco; Lac de Melo (Restonica river valley); between Volta and Scandulaie along a tributary stream of Tavignano river (NW of Aléria); 6 km SW of Vico, Sagone river valley; near Ghisoni; col de Vizzavona; Capannelle (SE of Vizzavona); Bocognano; col de Verde (S of Ghisoni); 1 km E of Tolla (Prunelli river valley); Palneca (Taravo river valley); S of col de Marcuccio (between Cauro and Bastelica); Monte Incudine; between Pietrosella and Fogolina (SE of Porticcio); 3 km N of col de la Vaccia (N of Aullène); col de Bavella; Punta Velaco (Bavella); between col de St-Eustache and col de Tana (W of Aullène); forêt de Valle Mala, near col de St-Eustache; Chiovone river valley (Aullène); near Aullène; near Serra-di-Scopamène (S of Aullène); 4 km E of Zonza; between Zonza and Quenza; Punta di u Carapono (Coti-Chiavari); between Casalabriva and Olmeto; S of col d'Illarata, between Zonza and l'Ospedale; between l'Ospedale and Zonza, E of Punta di u Diamante; l'Ospedale and surroundings; near Propriano; Monte Rosso (SE of Sartène); Tizzano and environs (SW of Sartène); La Trinité (N of Porto-Vecchio).

PREVIOUS RECORDS. — L'Ospedale, Vizzavona, Vico (DOLLFUS 1888, 1897, 1899; ARCANGELI 1925); Porto, Sartène, Porto-Vecchio, Melo (DOLLFUS 1888, 1897; ARCANGELI 1925); Ajaccio (SCHARFF 1894; DOLLFUS 1897); Corte (SHARFF 1894); Gravona (DOLLFUS 1897).

DISTRIBUTION. — The nominal subspecies is present in Corsica and Sardinia. A closely related subspecies, *T. corsica giustii* Taiti & Ferrara, 1980, is known from the islands of Capraia, Gorgona and Montecristo (unpublished datum), in the Tuscan Archipelago.

Tiroloscia macchiae Verhoeff, 1931

Philoscia (Tiroloscia) macchiae Verhoeff, 1931: 545.

MATERIAL EXAMINED. — Many ♂♂ and ♀♀ collected from the following localities: Ersa; Rogliano; Camera and environs (near Centuri); between marine de Meria and Macinaggio; Morsiglia; between Morsiglia and Pastina; near Meria; near Carbonacce (S of Luri); marine de Giottani (between Nonza and Centuri-Port); St-Léonard (W of marine de Pietracorbara); marine de Pietracorbara; Sta Catterina (N of marine de Sisco); near Crosciano along Sisco river; marine de Sisco; Nonza; near grotte de Brando; Erbalunga; Cardo (W of Bastia).

PREVIOUS RECORDS. — Corsica (VERHOEFF 1931).

DISTRIBUTION. — *Tiroloscia macchiae* is known from the Cap Corse peninsula, the south-western part of the Tuscan mainland and the Tuscan Archipelago (Elba and Pianosa islands) (TAITI & FERRARA 1989a, fig. 83).

Tiroloscia montana n.sp.
(Figs 11, 12)

MATERIAL EXAMINED. — 1 ♂ holotype (MZUF), 1 ♂ juv., 1 ♀ paratypes (MNHN-Is4102), 6 ♀♀, 6 juvs paratypes (MZUF), Haut-Asco, leg. S. Taiti and A. Poggesi, 21.VI.1984; 1 ♀ paratype (MZUF), Haut-Asco, 1600 m, leg. S. Taiti and S. Campanelli, 16.X.1982; 9 ♀♀ paratypes (SMNS), Haut-Asco, 1500-1600 m, leg. W. Schawaller, 27.VIII.1980; 1 ♂ juv., 9 ♀♀ paratypes (MZUF), forêt de Carozzica, *ca.* 2 km NE of Haut-Asco, leg. S. Taiti and A. Poggesi, 21.VI.1984.

ETYMOLOGY. — L. *montanus* = montane. The name refers to the collecting sites of the specimens, at an altitude of over 1500 m.

DESCRIPTION

Maximum dimensions: ♂, 6.5 × 2.5 mm; ♀, 8.5 × 4 mm.

Source : MNHN, Paris

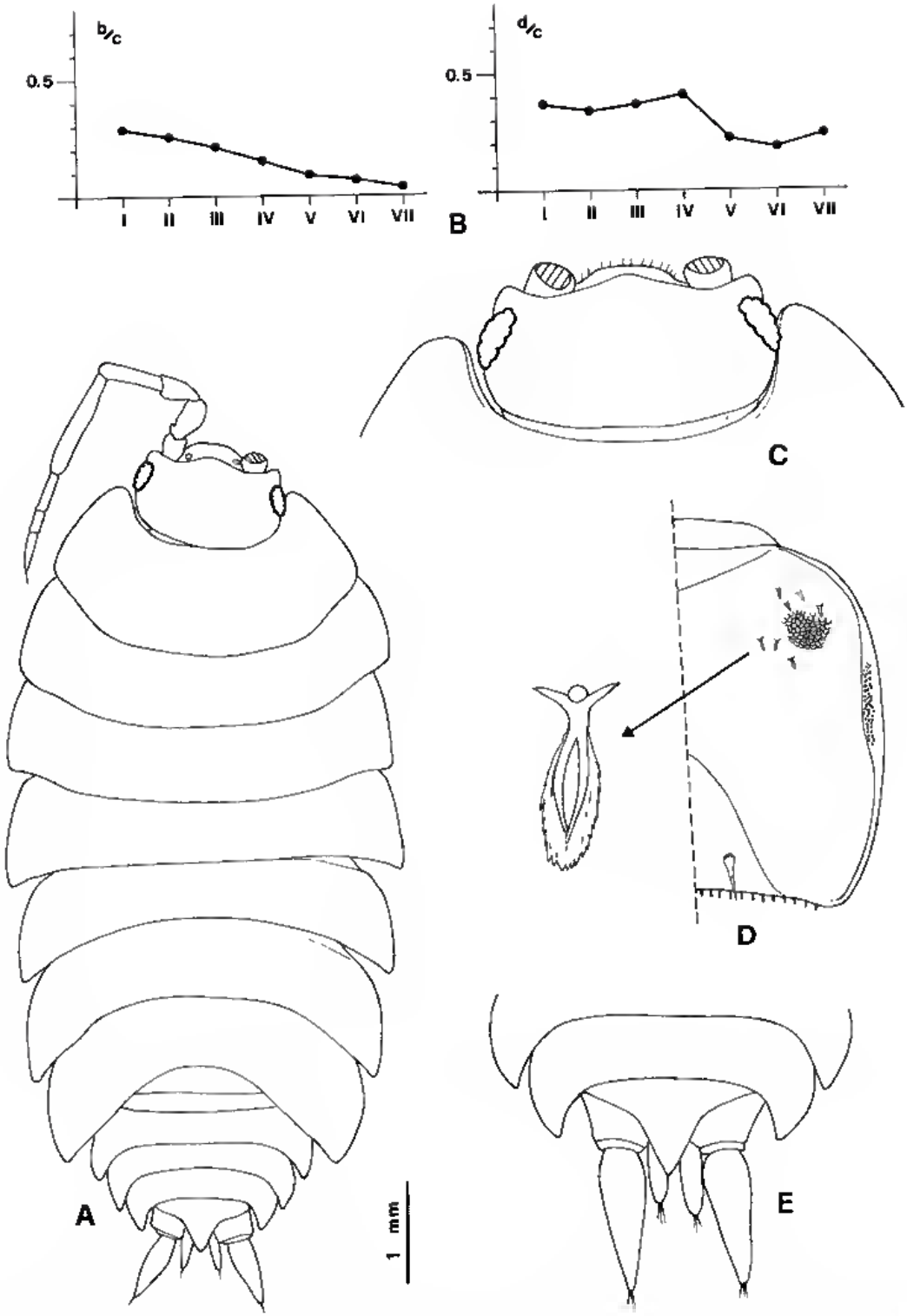


FIG. 11. — *Tiroloscia montana* n.sp.: A, adult ♀, dorsal; B, co-ordinates of noduli laterales; C, cephalon; D, right epimeron of pereonite 4; E, telson and uropods.

Source : MNHN, Paris

Brown colour with the usual yellowish muscle spots. Dorsal cuticle covered with numerous tiny semicircular scales and many lanceolate scale-spines. Marginal line of pereonites slightly distinct, more distant from the lateral margin in the anterior half where the numerous gland pores (> 50) are situated. Co-ordinates of the noduli laterales as in Fig. 11B. Eye with 15-17 ommatidia. Cephalon with median lobe at obtuse angle, slightly protruding; lateral lobes small, rounded; frontal line slightly bent down in the middle; suprantennal line straight. Pereonite 1 with posterior margin broadly rounded; pereonite 2 with subright posterior corners; pereonites 3-7 with posterior comers progressively more acute. Pleonites 3-5 with large falciform epimera, directed backwards. Telson triangular with broken sides and acute apex. Antenna with fifth article of peduncle slightly longer than flagellum; ratio of flagellar articles 5:3:5. Mandible with molar penicil dichotomized. Maxillular outer branch bearing ten (five cleft) teeth; inner branch with two penicils and a short posterior point. Maxillipedal endite with three strong spines at apex and no penicil. Pleopodal exopods with no respiratory areas.

Male

Pereopods 1-4 with a brush of short spines on merus and carpus. Pereopod 7 without distinct modifications. Pleopod 1 exopod ovoidal, with a slight indication of a posterior point; endopod with straight distal part bearing a line of short spines, apex with two spines and a tuft of setae. Pleopod 2 endopod slightly longer than exopod.

REMARKS

Tiroloscia montana is readily distinguished from *T. corsica corsica* and *T. macchiae*, the other two species in the genus present in Corsica, by the cephalon with more developed lateral lobes, the different shape of the dorsal scale-spines, the telson with broken sides, and the shape of the male pleopod 1 exopod with a slight indication of a posterior point.

In the shape of the dorsal scale-spines the new species resembles *T. esterelana* (Verhoeff, 1918), from which it differs in the broader body shape, larger pleonal epimera, the shape of the cephalon, telson and male pleopod 1.

It differs from *T. exigua* (Budde-Lund, 1885) and *T. pyrenaica* (Dollfus, 1897) in the shape of the scale-spines, telson and male pleopod 1 endopod; from *T. apenninorum* Verhoeff, 1908 essentially in the lack of a hook-shaped process on the male pereopod 7 merus.

Family ONISCIDAE
Genus **SARDONISCUS** Arcangeli, 1939

Sardoniscus pygmaeus (Budde-Lund, 1885)

Philoscia pygmaea Budde-Lund, 1885: 212; DOLLFUS 1887: 11; 1897: 91; 1899: 207.

Phalloniscus pygmaeus; VANDEL 1954a: 74; 1954c: 226, figs A-D; 1962: 532, figs 262-265; ARCANGELI 1954a: 123.

MATERIAL EXAMINED. — Many ♂♂ and ♀♀ collected from the following localities: Barcaggio (Cap Corse); Ersa; Camera (near Centuri); Rogliano; between Macinaggio and marine de Meria; between Morsiglia and Pastina;

Source : MNHN, Paris

2 km SE of col de Ste-Lucie (between Pino and Luri); Minervio (S of Pino); Carbonacce (S of Luri); marine de Giottani (between Nonza and Centuri-Port); Ponticello (near Pietracorbara); St-Léonard (W of marine de Pietracorbara); near Crosciano along Sisco river; Sta Catterina, N of marine de Sisco; between Ogliastro and Lainosa (N of Nonza); near Erbalunga; near grotte de Brando; Lavasina (S of Brando); Sta Maria-di-Lota; San Martino-di-Lota; Cardo (W of Bastia); col de Teghime (W of Bastia); near Murato (St Florent); Bevinco river valley, below col de S. Stefano; 1 km W of Altiani (SE of Speloncato); near Ponte Nuovo along Golo river; near grotte de Pietralbello (Moltifao); near Ponte Leccia; left bank of Golo river, 3 km S of Ponte Leccia; forêt de Carozzica

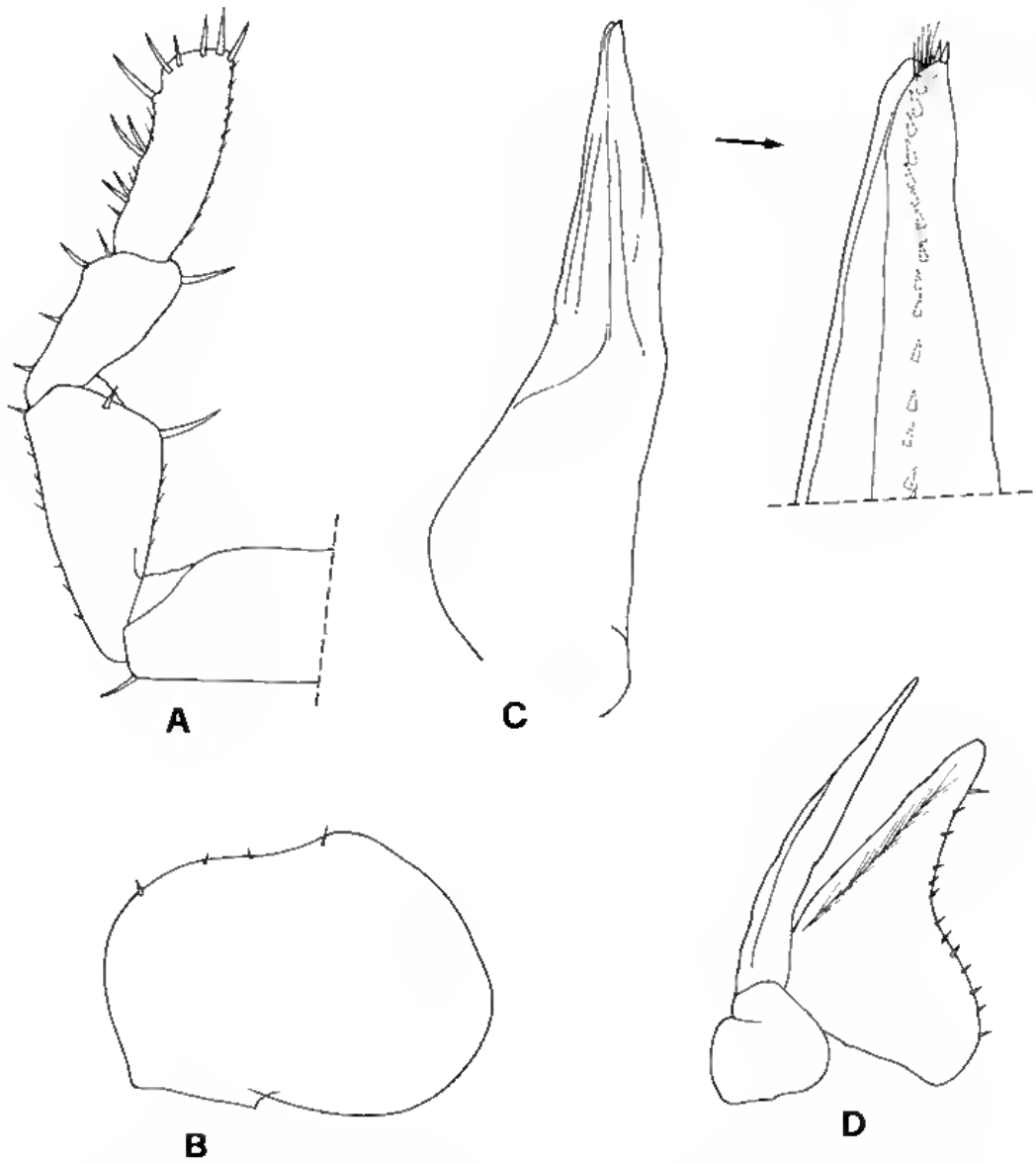


FIG. 12. — *Tiroloscia montana* n.sp., ♂: A, pereopod 7; B, pleopod 1 exopod; C, pleopod 1 endopod; D, pleopod 2.

Source : MNHN, Paris

(near Haut-Asco); Francardo (N of Corte); Castirla (N of Corte); Lano (NW of Corte); near the Eaux d'Orezza (NE of Piedicroce); 2 km S of Carticasi (NE of Corte); Cervione; forêt de Valdo-Niello (Golo river valley); Punta Cervello (SE of Cauro); Zicavo; between Pietrosella and Fogolina (SE of Porticcio); between Alza and Argiavara (col de Bavella); col de Bavella; between col de St-Eustache and col de Tana (SW of Aullène); Chiovone river valley, near Aullène; Serra-di-Scopamène (S of Aullène); 4 km E of Zonza; valley below chapelle Pianelli, between Casalabriva and Olmeto; Golfo di Sogno (N of Porto-Vecchio); Monte Rosso, SE of Sartène; Orasi (S of Sartène); near Tizzano, baie d'Avena (SW of Sartène); Viagenti (near Pianotolli, NW of Bonifacio); near Ermitage de la Trinité (W of Bonifacio).

PREVIOUS RECORDS. — La Solenzara (DOLLFUS 1897, 1899; VANDEL 1962); Bastia, Francardo, Lano, Solaro, Sari-di-Porto-Vecchio, Ste-Lucie-de-Porto-Vecchio, Propriano, Bonifacio (VANDEL 1954c, 1962).

DISTRIBUTION. — *Sardoniscus pygmaeus* is known from Corsica, Sardinia, Elba Island and some hills of central-western Tuscany (TAITI & FERRARA 1989a, fig. 84).

REMARKS

The genus *Sardoniscus* was erected by ARCANGELI (1939) to include the new species *S. pusillus* from Sardinia, described on specimens that he had previously identified as *Agabiformius hirtus* (Aubert & Dollfus, 1890) (ARCANGELI 1925). VANDEL (1954a) states that *S. pusillus* corresponds to "*Philoscia*" *pygmaea* Budde-Lund, 1885 and it belongs to *Phalloniscus* Budde-Lund, 1908, a genus instituted to accommodate some species from New Zealand. According to the French author the genus is also present in the Mediterranean and neotropical regions. Thus, according to VANDEL the correct taxonomic status of the species is *Phalloniscus pygmaeus* (Budde-Lund, 1885), of which *Sardoniscus pusillus* is a junior synonym. The ascription of this species to *Phalloniscus* was questioned by ARCANGELI (1954a) and FERRARA & TAITI (1978), but this status has been maintained in anticipation of comparison of species of *Phalloniscus* from New Zealand. However, we have to point out that, in one of his latest papers, VANDEL himself (1977) states that the genus *Phalloniscus* is endemic to New Zealand.

We have had the possibility recently to examine two specimens (1 ♂, 1 ♀) collected at Wellington, New Zealand, belonging to *Phalloniscus armatus* Bowley, 1935. Even if this is not the type-species of *Phalloniscus*[1], it certainly belongs to this genus. The Corsican species differs from *P. armatus* in some important generic characters and cannot be ascribed to *Phalloniscus*. In fact, it has a single nodulus lateralis (two in *P. armatus*) per side on the pereonites (see VANDEL 1962: 35 and FERRARA & TAITI 1978: 31, pl. 3, fig. XI, 1) and some cleft teeth (all teeth entire in *P. armatus*) on the outer branch of the maxillule. Thus, we consider valid the genus *Sardoniscus*, to which the species *pygmaeus* must be ascribed. All the other species from the Mediterranean area presently in *Phalloniscus* must be re-examined to define their correct generic position.

In a recent paper, SCHULTZ (1995) transferred the species of *Phalloniscus* from the neotropical region (some only tentatively) to the new genus *Novamumdoniscus*.

1. The type species of *Phalloniscus* is *Oniscus punctatus* Thomson, 1879, which, due to its vague description, has never been encountered again. In fact VANDEL (1977: 12) propose to suppress this name.

Source : MNHN, Paris

Family PLATYARTHRIDAE
Genus **PLATYARTHRUS** Brandt, 1833

Platyarthrus costulatus Verhoeff, 1908
(Figs 13A, 15)

Platyarthrus Nabeleki Frankenberger, 1939: 115, figs 1-2.

Platyarthrus costulatus; ARCANGELI 1950: 126; VANDEL 1953a: 163; 1954a: 73; LANZA & POGGESI 1986: 120, 178, 179.

Platyarthrus costulatus costulatus; VANDEL 1962: 461, figs 230, 231A; BERON 1972a: 11.

MATERIAL EXAMINED. — Many ♂♂ and ♀♀ collected from the following localities: Capo Grosso, Tollare and Barcaggio (Cap Corse); moulin Mattei (NE of Centuri-Port); Ersa; Rogliano; Centuri-Port; Camera (near Centuri); between Macinaggio and marine de Meria; Morsiglia; near Meria; marine de Giottani (between Nonza and Centuri-Port); Sta Catterina, N of marine de Sisco; Nonza; anse de Faggiola (désert des Agriates); col de S. Stefano (S of Olmeta-di-Tuda); near Sorio; col de S. Colombano (E of Belgodère); left bank of Golo river between Barchetta and Casamozza; near grotte de Pietralbello (Moltifao); Asco river valley; near Folelli, along Fium Alto; Francardo (N of Corte); Prunete (E of Cervione); plage de Caspio (NW of Porto); Casanova (S of Corte); between Volta and Scandulaie, along a tributary stream of Tavignano river (NW of Aléria); Aléria; Punta de la Parata (W of Ajaccio); Porticcio; between Pietrosella and Fogolina (SE of Porticcio); Punta di u Carapono (Coti-Chiavari); valley below chapelle Pianelli, between Casalabriva and Olmeto; Lovo Santo, swamp at mouth of Cavo river; Bocca Albitrina (SW of Sartène); la Trinité (N of Porto-Vecchio); Viagenti (near Pianotolli, NW of Bonifacio); Ermitage de la Trinité (NW of Bonifacio); Capo Pertusato (SE of Bonifacio); île de la Giraglia; île Pietricaggiosa (Cerbicale); îlot Toro Grande; îlot du Torello.

PREVIOUS RECORDS. — Ajaccio (FRANKENBERGER 1939); grotte des Paladini (Solaro) (VANDEL 1953a; BERON 1972a); all Corsica (VANDEL 1962); grotte de Sisco II (BERON 1972a); île Pietricaggiosa, îlot du Torello, îlot Toro Grande (LANZA & POGGESI 1986).

DISTRIBUTION. — This species occurs in northern Spain, the Balearic islands, Atlantic and Mediterranean part of France, Morocco and Algeria. In Italy it is recorded from Liguria, Tuscany, including the Tuscan Archipelago (Capraia, Gorgona and Elba islands), Sardinia, Ischia Island, Tremiti islands, Sicily and surrounding islands (Aeolian, Aegadean and Pantelleria).

Platyarthrus corsicus n.sp.
(Figs 13B, C, 14, 15)

MATERIAL EXAMINED. — 1 ♂ holotype (MZUF), 2 ♂♂, 3 ♀♀ paratypes (MNHN-Is4098), many ♂♂ and ♀♀ paratypes (MZUF), between Cauro and col de St-Georges (E of Ajaccio), 650-680 m, leg. S. Taiti, 14.V.1982; 1 ♂, 8 ♀♀ paratypes (MZUF), Punta de la Parata (W of Ajaccio), leg. S. Taiti, 14.V.1982; many ♂♂ and ♀♀ paratypes (MZUF), between Pietrosella and Fogolina (SE of Porticcio), ilex and arbutus wood, leg. S. Taiti and S. Campanelli, 21.X.1982; 2 ♂♂, 1 ♀ paratypes (MZUF), between Alza and Argiavara (col de Bavella), along the first left tributary stream of S. Pietro river, ilex grove, leg. S. Taiti, 11.VII.1978; 2 ♂♂, 3 ♀♀ paratypes (MNHN-Is4099), many ♂♂ and ♀♀ paratypes (MZUF), col de Bavella, leg. S. Taiti, 14.IV.1981; 4 ♂♂, 6 ♀♀ paratypes (MZUF), between col de St Eustache and col de Tana (W of Aullène), coniferous forest, leg. S. Taiti and S. Campanelli, 22.X.1982; 2 ♂♂, 3 ♀♀ paratypes (MZUF), forêt de Valle Mala (S of col de St-Eustache), leg. S. Taiti and S. Campanelli, 22.X.1982; many ♂♂ and ♀♀ paratypes (MZUF), Punta di u Carapono (Coti-Chiavari), leg. S. Taiti and S. Campanelli, 21.X.1982; many ♂♂ and ♀♀ paratypes (MZUF), valley below chapelle Pianelli, between Casalabriva and Olmeto, leg. S. Taiti and S. Campanelli, 22.X.1982; 1 ♀ paratype (MZUF), Fiumicicoli river valley, 700 m, leg. W. Schawaller, 1.VIII.1980; many ♂♂ and ♀♀ paratypes (MZUF), Monte Rosso (SE of Sartène), ilex grove and meadow, leg. S. Taiti and S. Campanelli, 20.X.1982; 2 ♂♂, 3 ♀♀ paratypes (MNHN-Is4096), many ♂♂ and ♀♀ paratypes (MZUF), Tizzano and surroundings (SW of Sartène), ilex grove, leg. S. Taiti and S. Campanelli, 15.V.1982.

Source : MNHN, Paris

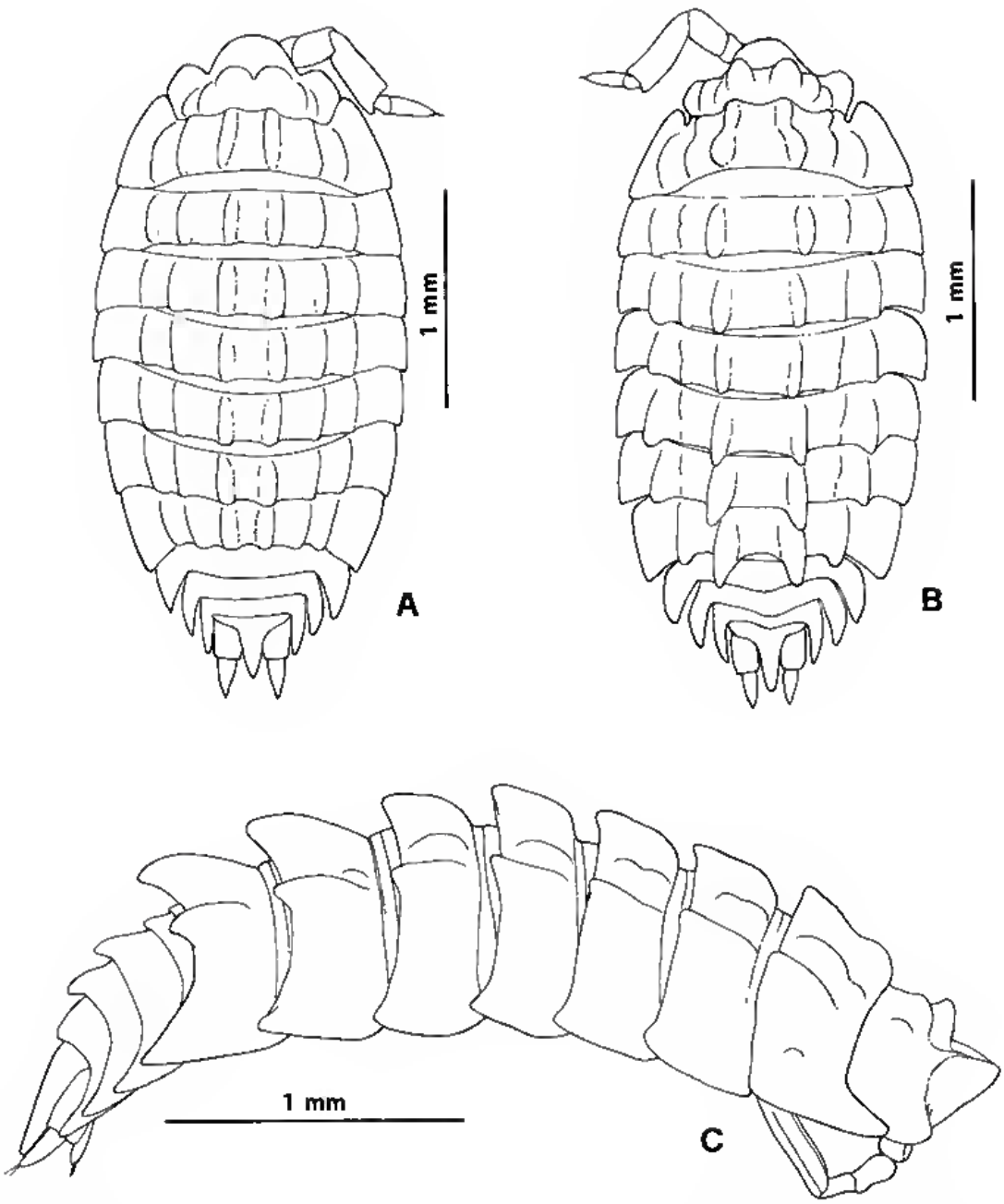


FIG. 13. — *Platyarthrus costulatus*: A, adult ♀, dorsal. *Platyarthrus corsicus* n.sp.: B, adult ♀, dorsal; C, adult ♀, lateral.

Source : MNHN, Paris

DESCRIPTION

Maximum dimensions: ♂, 2.5 × 1.1 mm; ♀, 3.3 × 1.3 mm.

Colourless body, eye absent. Dorsal ornamentation: cephalon with 2 + 2 large tubercles on vertex; pereonite 1 with 3 + 3 ridges and a small tubercle at the base of epimera; pereonites 2-6 with 3 + 3 ridges, very protruding except the second one on each side which progressively gets

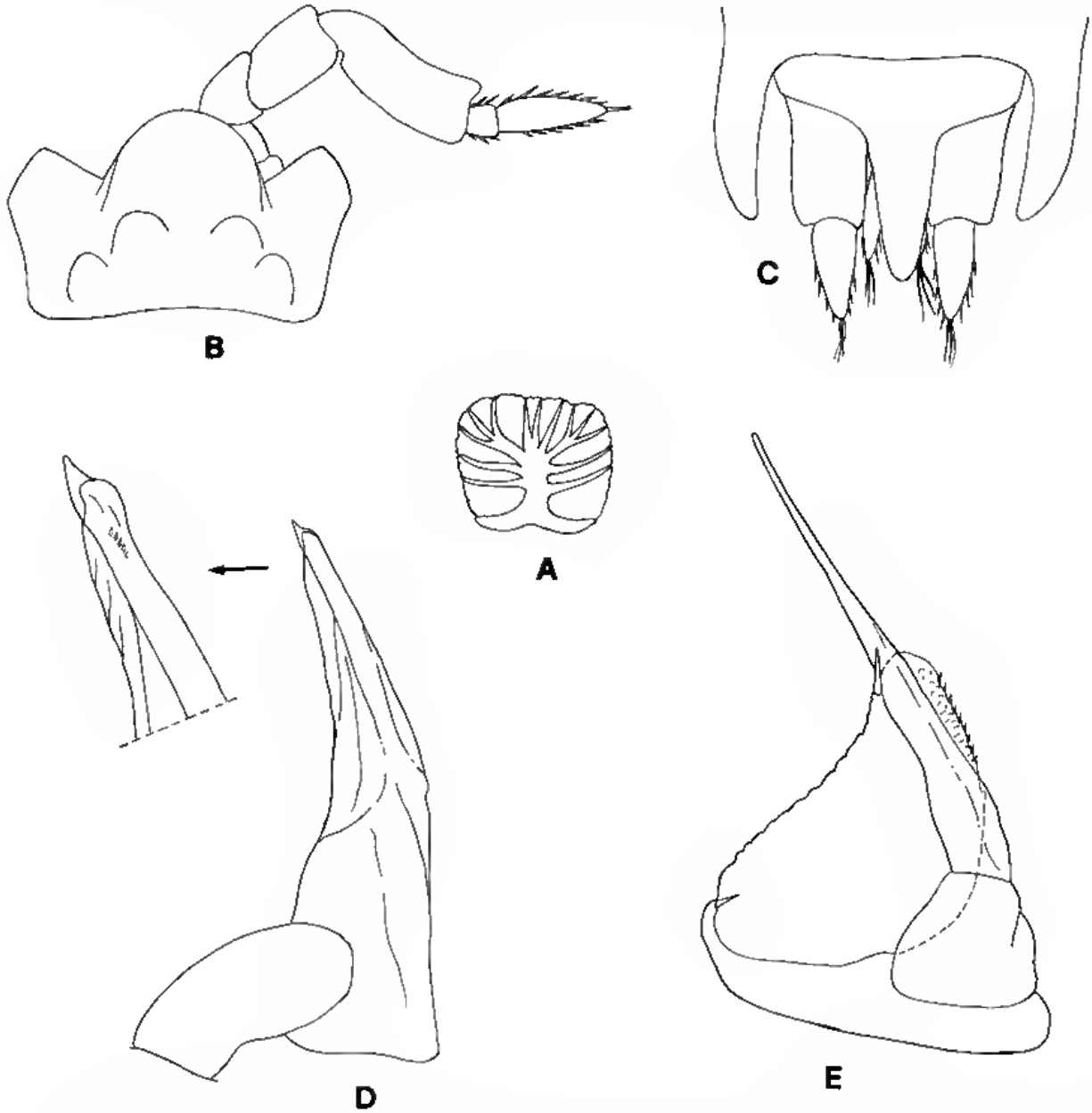


FIG. 14. — *Platyarthrus corsicus* n.sp.: A, dorsal scale-spine; B, cephalon and right antenna; C, telson and uropods; D, ♂ pleopod 1; E, ♂ pleopod 2.

Source : MNHN, Paris

smaller from front to back; pereonite 7 with 2 + 2 ridges, well developed and protruding backwards. Dorsum with many rounded and flattened scale-spines. Body very convex, ovoidal. Cephalon with median lobe rounded, protruding frontwards and slightly hollow dorsally; lateral lobes subquadrangular, tranversely directed frontwards. Pereonite 1 with posterior corners right-angled, becoming progressively more acute in the following pereonites. Pleonites 3-5 with epimera falciform, narrow and long, directed backwards. Telson with a short basal part and a narrow triangular distal part, clearly protruding backwards compared with the uropodal protopods. Antenna with thickset peduncular articles; second flagellar article about three times as long as first. Uropods with thickset exopod, slightly shorter than protopod.

Male

Pleopod 1 exopod small and ovoidal; endopod with apical part slightly swollen and pointed. Pleopod 2 endopod much longer than exopod.

REMARKS

Platyarthrus corsicus is morphologically close to *P. costulatus*, from which it differs in having more developed lateral and paramedian ridges on pereonites 1-6, and 2 + 2 instead of 3 + 3 ridges on pereonite 7. These differences are constant and no specimens with intermediate characters have been observed, even from localities where both forms have been collected. In our opinion these two forms belong to distinct, even if closely related, species.

In the past *P. corsicus* has certainly been confused with *P. costulatus* and some records from Corsica of the latter refer to the new species, which is present only in the southern part of the island.

Platyarthrus caudatus Aubert & Dollfus, 1890
(Fig. 15)

Platyarthrus caudatus; VANDEL 1954a: 73; 1962: 457, figs 228-229.

MATERIAL EXAMINED. — 1 ♀, Cardo (W of Bastia), leg. F. Bernini, 19.IV.1980; 1 juv., same locality, leg. S. Taiti and S. Campanelli, 12.X.1982; 5 ♀♀, Ermitage de la Trinité (W of Bonifacio), leg. S. Taiti, 12.IV.1981.

PREVIOUS RECORDS. — Brando, Sisco, Bonifacio (VANDEL 1962).

DISTRIBUTION. — Known from most of the lands of the western Mediterranean.

Platyarthrus aiasensis Legrand, 1953
(Fig. 15)

MATERIAL EXAMINED. — 8 ♀♀, Ermitage de la Trinité (W of Bonifacio), leg. S. Taiti, 12.IV.1981.

DISTRIBUTION. — This species has a West-Mediterranean-Atlantic distribution. It is known from Aix Island, the Canaries, Madeira Island, Algeria, Corsica, Sardinia, south-western Tuscany and the Tuscan Archipelago (Elba, Gorgona and Giannutri islands), Sicily and surrounding islands (Aeolian, Ustica, Aegadean, Pantelleria, Pelagean), and Malta. It has been introduced to South Africa (Cape Town), the USA (California and Texas) and St Barthelemy Island in the Caribbean (GARTHWAITE & TAITI 1989).

Source : MNHN, Paris

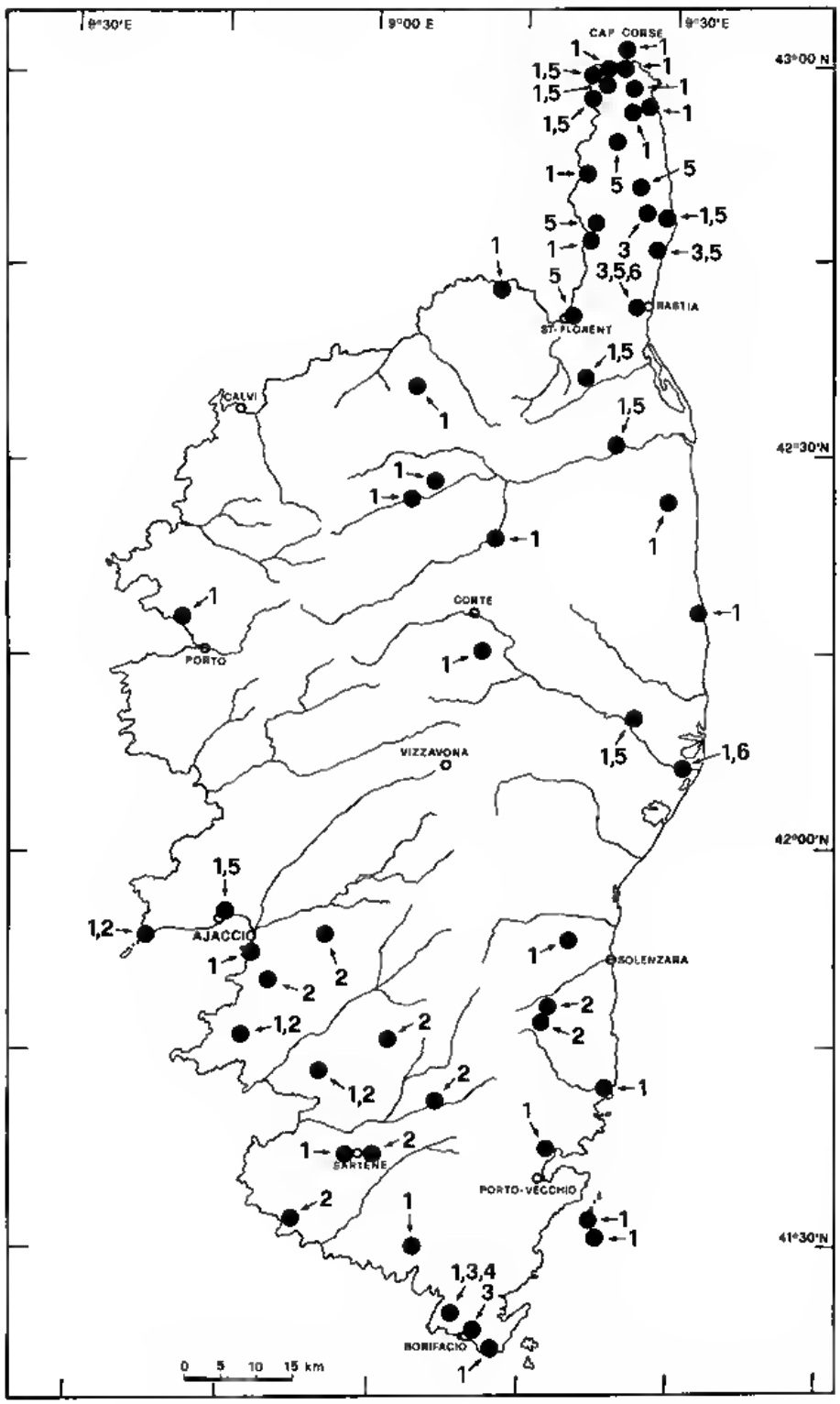


FIG. 15. — Distribution in Corsica of *Platyarthrus* species: 1, *P. costulatus*; 2, *P. corsicus*; 3, *P. caudatus*; 4, *P. atasensis*; 5, *P. schoeblii schoeblii*; 6, *P. hoffmannseggii*.

Source : MNHN, Paris

Platyarthrus schoeblii schoeblii Budde-Lund, 1885
(= P. schoeblii intermedius Vandel, 1946)
(Fig. 15)

Platyarthrus schoeblii; SCHARFF 1894: 163; DOLLFUS 1899: 190; ARCANGELI 1925: 446; VANDEL 1954a: 73.

Platyarthrus schöbli schöbli; VANDEL 1962: 456, fig. 227B.

MATERIAL EXAMINED. — Many ♂♂ and ♀♀ collected from the following localities: moulin Mattei (NE of Centuri-Port); Rogliano; Morsiglia; Carbonacce (S of Luri); Ponticello (near Pietracorbara); Sta Catterina, N of marine de Sisco; near Crosciano along Sisco river; between Ogliastro and Lainosa (N of Nonza); near grotte de Brando; Cardo (W of Bastia); col de S. Stefano (S of Olmeta-di-Tuda); left bank of Golo river between Barchetta and Casamozza; between Volta and Scandulaie along tributary stream of Tavignano river (NW of Aléria).

PREVIOUS RECORDS. — St-Florent (SCHARFF 1894); Vico, Ajaccio (DOLLFUS 1899; ARCANGELI 1925); Corsica (VANDEL 1962).

DISTRIBUTION. — Due to the uncertainties in the taxonomy of the *schoeblii*-group (see also CARUSO & LOMBARDO 1982; CARUSO *et al.* 1987), it is difficult to define the distributions of the various subspecies. Besides Corsica, *P. schoeblii schoeblii* Budde-Lund (= *P. schoeblii intermedius* Vandel) is present in southern France, Sardinia, the Tuscan mainland and the Tuscan Archipelago, Sicily, Aeolian islands, Malta and Algeria.

REMARKS

According to VANDEL (1962) the subspecies *P. schoeblii schoeblii* is present and widely distributed in Corsica. The numerous specimens examined by us belong instead to the subspecies *P. schoeblii intermedius* Vandel, which, according to the French author, is distinguished from the nominal taxon by the presence of a residual ridge 4 on the pereonites (absent in the subspecies *schoeblii*, see VANDEL 1962, figs 227A and 227B). We have been able to re-examine the syntypes of *P. schoeblii* described by BUDDE-LUND (1885) from Bona, Algeria, deposited in the Natural History Museum, London and the Zoologisk Museum, Copenhagen. All the specimens have the dorsal ridges as in *P. schoeblii intermedius* Vandel, which therefore is a junior synonym of the nominal subspecies.

Most probably *P. schoeblii schoeblii sensu* Vandel is a distinct subspecies from *P. schoeblii schoeblii sensu* Budde-Lund but it cannot take this name. However, in Corsica only *P. schoeblii schoeblii sensu* Budde-Lund *nec* Vandel (= *P. schoeblii intermedius* Vandel) is present.

Platyarthrus hoffmannseggii Brandt, 1833
(Fig. 15)

MATERIAL EXAMINED. — 1 ♀, Cardo (W of Bastia), leg. F. Bernini, 19.IV.1980; 1 ♂, 1 ♀, Aléria, leg. F. Giusti, 30.XI.1983.

DISTRIBUTION. — This species is distributed in central-southern Europe.

Source : MNHN, Paris

Family CYLISTICIDAE
Genus **CYLISTICUS** Schnitzler, 1853

Cylisticus convexus (De Geer, 1778)
(Fig. 17)

Cylisticus convexus; VANDEL 1954a: 74; 1962: 559, figs 275, 276.

RECOROS. — Bastia (VANOEL 1962).

DISTRIBUTION. — *Cylisticus convexus* is widely distributed in Europe and Asia Minor, and it has been introduced with human activities to northern Africa, St Helena Island and America. Also the record of this species in Corsica, based on a single specimen, is certainly due to an occasional introduction.

Cylisticus vandeli Taiti & Ferrara, 1980
(Fig. 17)

Cylisticus gracilipennis; DOLLFUS 1887: 10 (*partim*: Corsica); 1899: 187 (*partim*: grotte d'Erbalunga); ARCANGELI 1925: 47 (*partim*: grotte d'Erbalunga).

Cylisticus esterelanus; ARCANGELI 1950: 176; CASSOLA 1982: 654.

Cylisticus nasutus; VANDEL 1953a: 164; 1954a: 74; 1962: 573, figs 286, 287; BERON 1972a: 12; TAITI & MANICASTRI 1980: 256, fig. 9 (*partim*: Corsica).

Cylisticus vandeli Taiti & Ferrara, 1980: 270, fig. VI.

MATERIAL EXAMINED. — Many ♂♂ and ♀♀ collected from the following localities: Tollare (Cap Corse); Ersa; near Rogliano; Camera (near Centuri); between Macinaggio and marine de Meria; between Morsiglia and Pastina; near Carbonacce (S of Luri); marine de Giottani (between Nonza and Centuri-Port); Ponticello (near Pietracorbara); St-Léonard (W of marine de Pietracorbara); Sta Catterina, N of marine de Sisco; near Crosciano along Sisco river; between Ogliastro and Lainosa (N of Nonza); Nonza; near grotte de Brando; Erbalunga; near Bastia; Cardo (W of Bastia); Olmeta-di-Tuda; Urtaca; between Barchetta and Casamozza along left bank of Golo river; near grotte de Pietralbello (Moltifao); grotte de Pietralbello; 3 km S of Ponte Leccia; Francardo; grotte de Sabara; Fium Alto valley, loc. Casette; near Lano (E of Omessa); Casanova (S of Corte); Fontaine de Padula (between Vivario and Vezzani); col de Vizzavona; near Ghisoni; Bocognano; Rocchio Pinzuto, lungo il ruscello Fiumicelle, affluente del Fiume Solenzara; between Cauro and col de St-Georges (W of Ajaccio); between Pietrosella and Fogolina (SE of Porticcio); Punta di u Carapono (Coti-Chiavari); between col de St-Eustache and col de Tana (W of Aullène); forêt de Valle Mala, near col de St-Eustache; valley below chapelle Pianelli, between Casalabriva and Olmeto; Ermitage de la Trinité (W of Bonifacio).

PREVIOUS RECORDS. — Grotte d'Erbalunga (DOLLFUS 1899; ARCANGELI 1925; VANOEL 1962); grotte des Maures (Poggio di Venaco) (VANDEL 1953a, 1962; BERON 1972a); forêt de Valdo-Niello (VANDEL 1962); grotte de Grottone (Lama) (BERON 1972a); Ghisoni (TAITI & FERRARA 1980).

DISTRIBUTION. — This species is endemic to Corsica, where it is widely distributed.

Cylisticus uncinatus n.sp.
(Figs 16, 17)

MATERIAL EXAMINED. — 1 ♂ holotype, 3 ♂♂, 4 ♀♀ paratypes (MZUF), 1 ♂, 2 ♀♀ paratypes (MNHN-Is4104), 1 ♂ juv., 1.6 km from Stazzona, near road to the Eaux d'Orezza, leg. S. Taiti and A. Poggesi, 20.VI.1984; 2 ♂♂ paratypes (MZUF), col de Teghime, humus, leg. F. Bernini, 20.IV.1980; 1 ♂ paratype (SMNS), Bevinco river valley, below col de S. Stefano, leg. W. Schawaller, 27.VII.1980; 1 ♂, 2 ♀♀ paratypes, near Sorio, near Viacale bridge on Chiaraggio stream, leg. S. Taiti and S. Vanni, 9.III.1994 (MZUF); 2 ♂♂, 5 ♀♀ paratypes

Source : MNHN, Paris

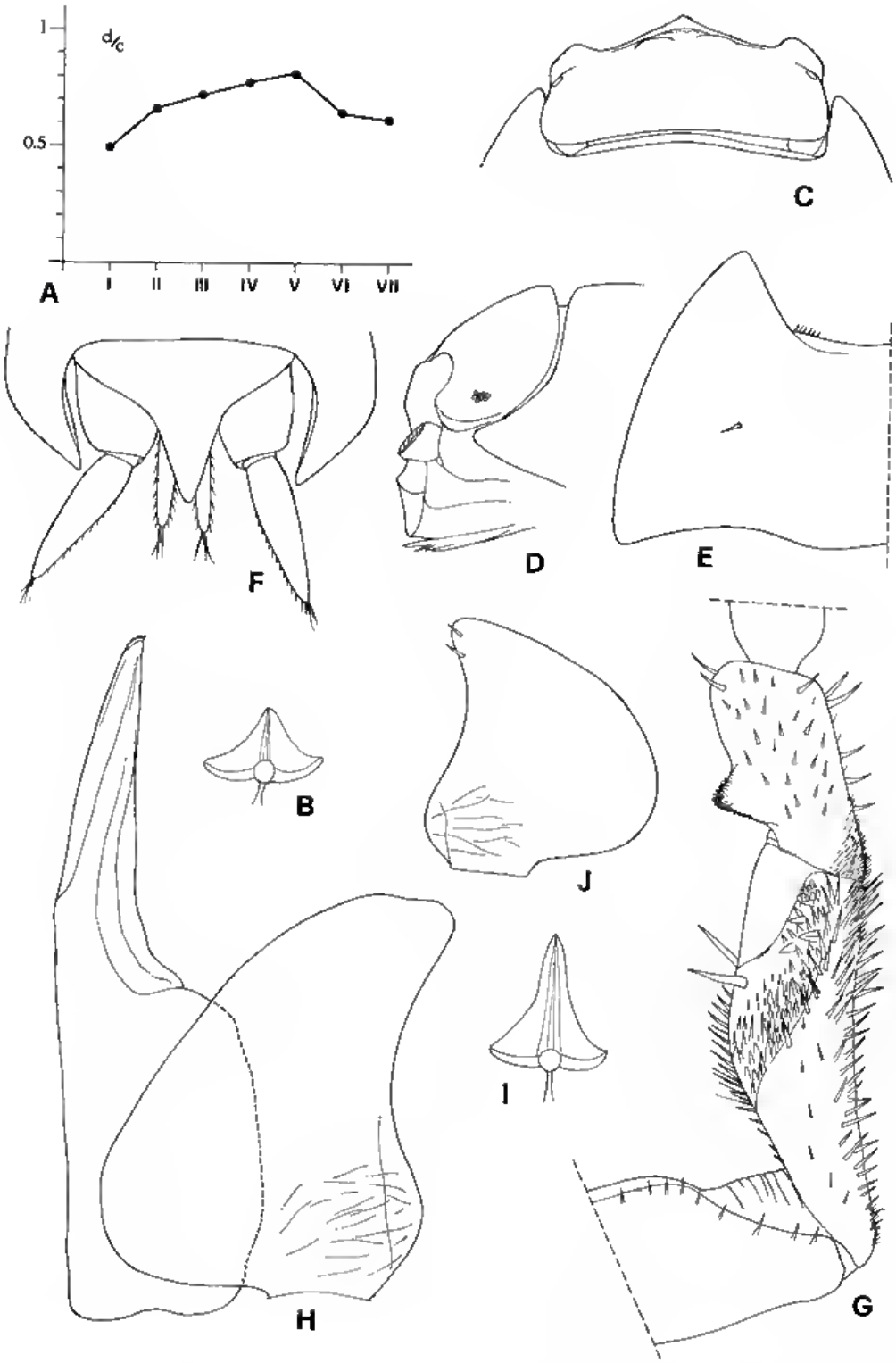


FIG. 16. — *Cylisticus uncinatus* n sp., specimens from Stazzona environs: A, d/c co-ordinates of noduli laterales; B, dorsal scale-spine; C, cephalon, dorsal; D, cephalon, lateral; E, left epimeron of pereonite 1; F, telson and uropods; G, ♂ pereopod 7; H, ♂ pleopod 1. Specimens from col de Bavella: I, dorsal scale-spine; J, ♂ pleopod 1 exopod

Source : MNHN, Paris

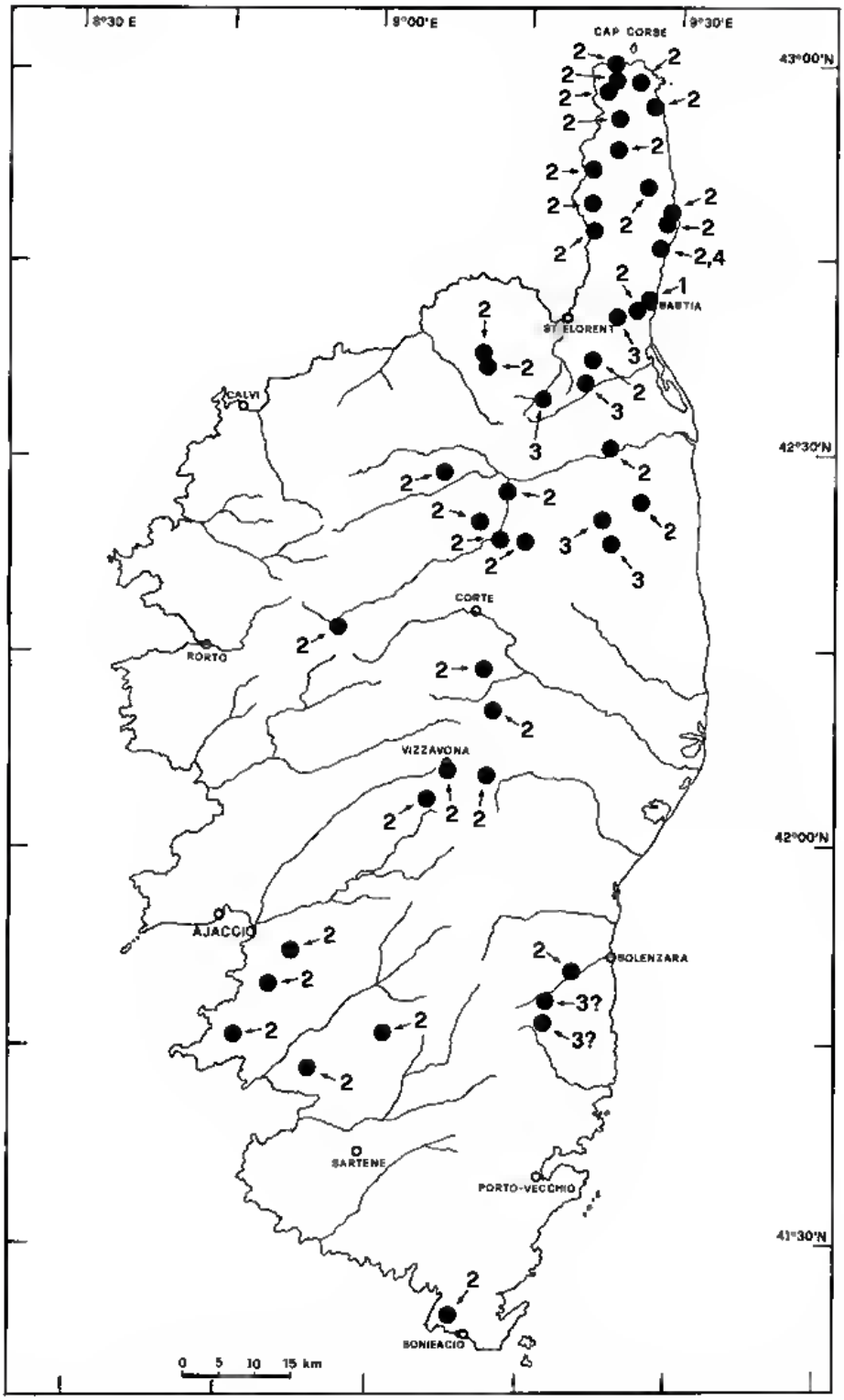


FIG. 17. — Distribution in Corsica of Cylisticidae species: 1, *Cylisticus convexus*; 2, *C. vandeli*; 3, *C. uncinatus*; 4, *Troglocylisticus cyrnensis*.

Source : MNHN, Paris

(MZUF), Monte S. Petrone slopes, 1000-1500 m, leg. A. Torchia and S. Zoia, 25.V.1982; 3 ♂♂, 6 ♀♀ paratypes (MZUF), Punta di Chiarsgioli, Monte S. Petrone, NW slope, 1100 m, beech wood, leg. S. Taiti and A. Poggesi, 21.VI.1984; ? 1 ♂, 8 ♀♀ (MZUF), col de Bavella, between Alza and Argiavara, along first left stream of S. Pietro river, ilex grove, leg. S. Taiti, 11.VII.1978; ? 3 ♂♂, 6 ♀♀ (MZUF), col de Bavella, coniferous forest, leg. S. Taiti, 14.IV.1981.

ETYMOLOGY. — L. *uncinatus* = having a hook. The name refers to the characteristic triangular process on the male pereopod 7 merus.

DESCRIPTION

Maximum length: ♂, 11.5 mm; ♀, 13 mm.

Body very pale brown. Dorsum smooth, with tiny triangular scale-spines. Noduli laterales almost at the same distance from lateral margin; d/c co-ordinates with a maximum on pereonite 5. Eye small, with 5 to 10 ommatidia, according to the animal's size. Cephalon with median lobe triangular, very obtuse, slightly protruding above the vertex and frontwards; lateral lobes small, quadrangular. Pereonite 1 with posterior margin slightly concave at the sides. Telson with distal part much narrower than basal, triangular, subacute apex distinctly protruding backwards in comparison with uropodal protopods. Antenna with second flagellar article 1.5 times as long as the first.

Male

Pereopods 1-4 with a brush of spines on carpus and, more sparsely, on merus. Pereopod 7 ischium with rostral surface transversely depressed and covered with short setae, sternal margin slightly concave with long setae; merus with a protruding setose triangular process on tergal margin. Pleopod 1 exopod triangular with a short rounded posterior point bent outwards, outer margin sinuous; endopod with straight apical part and no particular modifications.

REMARKS

Cylisticus uncinatus, as well as *C. vandeli*, belongs to the *nasutus*-group of *Cylisticus* (see FERRARA & TAITI 1978, 1985; TAITI & MANICASTRI 1980; TAITI & FERRARA 1980), which includes fifteen more species and subspecies distributed in southern France, central Italy and Sardinia. The new species is readily distinguishable from all others by the distinct process on the male pereopod 7 merus. In the shape of the cephalon, telson and male pleopod 1 exopod, *C. uncinatus* is close to the other Corsican species, *C. vandeli*, from which it differs, besides the above-mentioned character, in its larger dimensions, presence of a feeble pigmentation, more developed eye, and the male pleopod 1 endopod with apical part straight instead of bent outwards.

The specimens from col de Bavella show some differences from the type specimens in the scale-spines longer and more pointed (Fig. 16I), which give a setose look to the specimens, and in the shape of the male pleopod 1 exopod (Fig. 16J). All the other characters, particularly the shape of the male pereopod 7, are identical to those of the type specimens. They might belong to a distinct species but more material is needed for a certain identification.

Source : MNHN, Paris

Genus **TROGLOCYLISTICUS** Ferrara & Taiti, 1983

Troglocylisticus cyrnensis Ferrara & Taiti, 1983
(Fig. 17)

Troglocylisticus cyrnensis Ferrara & Taiti, 1983: 485, figs I-II.

RECORDS. — Grotte de Brando (FERRARA & TAITI 1983).

DISTRIBUTION. — Known only from the type locality.

Family PORCELLIONIDAE
Genus **PROTRACHEONISCUS** Verhoeff, 1917

Protracheoniscus babori Frankenberger, 1938

Protracheoniscus occidentalis; VANDEL 1954a: 74; 1962: 578, figs 288-290.
Protracheoniscus babori; TAITI & FERRARA 1980: 278.

MATERIAL EXAMINED. — Many ♂♂ and ♀♀ collected from the following localities: between Barcaggio and Punta di Agnello (Cap Corse); marine de Pietracorbara; Lovo Santo, swamp at mouth of Cavo river.

PREVIOUS RECORDS. — Marine de Pietracorbara (VANDEL 1962); mouth of Cavo river (TAITI & FERRARA 1980).

DISTRIBUTION. — This species has a wide distribution: besides Corsica, it is recorded from southern France, Catalonia, Italy (Tuscany and Sicily), Croatia, Albania (cited as *Protracheoniscus albanicus* Arcangeli, 1952; see SCHMALFUSS 1983), Greece and probably southern Russia.

REMARKS

Examination of the abundant material from Corsica shows that these specimens belong to *P. babori* as redescribed by TAITI & FERRARA (1980). In fact, the male pereopod 7 ischium has a deep concavity covered with setae, the merus bears a process at the base, and the carpus is distinctly arched on the tergal margin. However, these characters are clearly visible only in fully adult specimens.

Thanks to the courtesy of Dr. H. DALENS (Toulouse), we could examine some specimems of *Protracheoniscus occidentalis* Vandel, 1939 collected near Toulouse, which proved this species to be synonymous with *P. babori*.

Genus **PORCELLIONIDES** Miers, 1877

Porcellionides pruinosus (Brandt, 1833)

Metoponorthus (Metoponorthus) pruinosus; VANDEL, 1954a: 74.

MATERIAL EXAMINED. — Many ♂♂ and ♀♀ collected from the following localities: Rogliano; near moulin Mattei, N of Centuri-Port; Centuri-Port; between Bastia and St-Florent; défilé de Lancone; entrance of grotte de Grottone, near Lama; Asco river valley; near Ermitage de la Trinité (W of Bonifacio); île de la Giraglia.

Source : MNHN, Paris

PREVIOUS RECORDS. — Corsica (VANOEL 1954a).

DISTRIBUTION. — Cosmopolitan species.

Porcellionides sexfasciatus sexfasciatus (Budde-Lund, 1885)

Metoponorthus sexfasciatus; SCHARFF 1894: 163; DOLLFUS 1899: 189.
Metoponorthus (Polytretus) sexfasciatus; VANDEL 1954a: 74.
Metoponorthus (Polytretus) sexfasciatus sexfasciatus; VANDEL 1962: 608, figs 299-302.

MATERIAL EXAMINED. — Many ♂♂ and ♀♀ collected from the following localities: near Bastia; Casta (SW of St-Florent); entrance of grotte de Grottone, near Lama; Calzarello, SE of Ghisonaccia; Punta de la Parata (W of Ajaccio).

PREVIOUS RECORDS. — Corte (SCHARFF 1894); Vizzavona, Porto-Vecchio (DOLLFUS 1899); littoral regions of Corsica (VANDEL 1962).

DISTRIBUTION. — It is known from the Atlantic islands, Morocco, Algeria, Tunisia, Spain, France, Italy and Malta.

Genus **ACAEROPLASTES** Verhoeff, 1918

Acaeroplastes melanurus sardous Verhoeff, 1918
(Fig. 18)

Metoponorthus melanurus; BUDDE-LUND 1885: 181 (*partim*: Corsica); SCHARFF 1894: 163; DOLLFUS 1899: 189.
Metoponorthus (Acaeroplastes) melanurus; ARCANGELI 1950: 115.
Metoponorthus (Acaeroplastes) melanurus sardous; VANDEL 1954a: 74.
Acaeroplastes melanurus sardous; VANDEL 1962: 633, fig. 313; TAITI & FERRARA 1980: 280.
Aceroplastes [sic!] *melanurus sardous*; LANZA & POGGESI 1986: 121, 176, 180, 188.

MATERIAL EXAMINED. — Many ♂♂ and ♀♀ collected from the following localities: Tollare (Cap Corse); Centuri-Port; marine de Giottani (between Nonza and Centuri-Port); marine de Pietracorbara; anse de Faggiola, désert des Agriates; Casta (SW of St-Florent); Pas du Diable (W of Casta); col de S. Stefano (S of Olmeta-di-Tuda); col de S. Colombano (E of Belgodère); between Barchetta and Casamozza along left bank of Golo river; forêt de Tartagine; Ghisonaccia; Porticcio; below Punta di Boccarona, along Solenzara river; between col de Bavella and Punta Velaco; Sollacaro (N of Olmeto); Fautea (between Solenzara and Porto-Vecchio); Lovo Santo, swamp at mouth of Cavo river; mouth of Rizzanèse river (SW of Propriano); Golfo di Sogno (NE of Porto-Vecchio); Bocca Albitrina (SW of Sartène); Monte Rosso (SE of Sartène); dolmen de Fontanaccia (S of Sartène); Tizzano and environs, baie d'Avena (SW of Sartène); Viagenti (near Pianotolli, NW of Bonifacio); Capo Pertusato (SE of Bonifacio); île Spano (NE of Calvi); îlot Fautea; îlot sud de la Tonnara (golfe de Ventilegne); rocher sud de Ratino (W of île Cavallo); îlot Sperduto Grande (E of île Cavallo).

PREVIOUS RECORDS. — Corsica (BUDDE-LUND 1885); Ajaccio (SCHARFF 1894; DOLLFUS 1899); étang de Biguglia (DOLLFUS 1899); all Corsica, Ponte Leccia, Sta-Maria-Figaniella and Sartène (VANDEL 1962); mouth of Cavo river (TAITI & FERRARA 1980); îlot Fautea, îlot Sperduto Grande, rocher sud de Ratino, île Spano (LANZA & POGGESI 1986).

DISTRIBUTION. — Known from Corsica, Sardinia and Tuscany (Montecristo and Elba Islands, La Scarpa islet near Pianosa Island, Monte Massoncello, Uccellina and Monte Argentario).

Source : MNHN, Paris

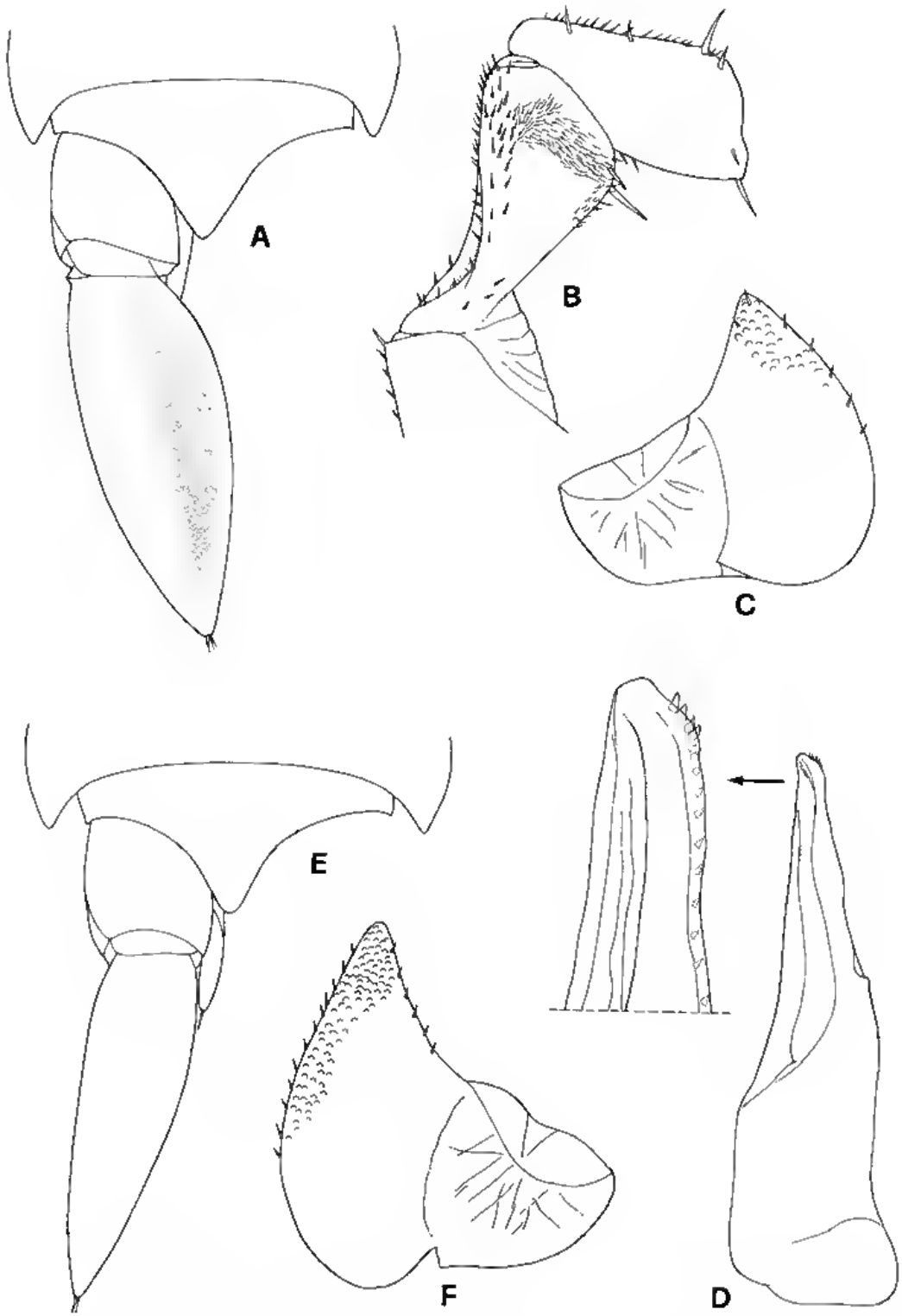


FIG. 18. — *Acaeroplastes melanurus sardous*, ♂ from Capo Pertusato: A, telson and left uropod; B, pereopod 7; C, pleopod 1 exopod; D, pleopod 1 endopod. ♂ from Tollare: E, telson and left uropod; F, pleopod 1 exopod.

Source : MNHN, Paris

REMARKS

The abundant material examined revealed some differences in the male uropodal exopod in the various populations. Southern populations (*e.g.* Capo Pertusato) (Fig. 18A) have a much more flattened and widened exopod than northern ones (*e.g.* Cap Corse peninsula) (Fig. 18E), even in male specimens of the same length (9 mm). In some populations (*e.g.* Cavo river mouth) this appendage has an intermediate development, while the shape of the male pereopod 7 and pleopod 1 is identical in all populations. In our opinion these differences must be considered within the variability of this subspecies.

Genus **LEPTOTRICHUS** Budde-Lund, 1885

Leptotrichus panzerii (Audouin, 1826)

Leptotrichus Panzerii; BUDDE-LUND 1885: 193, 194; ARCANGELI 1914: 477; 1950: 121.
Leptotrichus Panzeri; DOLLFUS 1887: 10; ARCANGELI 1925: 17; VANDEL 1954a: 74.
Leptotrichus panzeri; VANDEL 1962: 645, figs 317-319.

MATERIAL EXAMINED. — Many ♂♂ and ♀♀ collected from the following localities: Centuri-Port; Bonifacio; Capo Pertusato (SE of Bonifacio).

PREVIOUS RECORDS. — Corsica (BUDDE-LUND 1885; DOLLFUS 1887; VANDEL 1954a); Bonifacio and Propriano (VANDEL 1962).

DISTRIBUTION. — This species occurs in all the lands encompassing the Mediterranean Sea, Madeira Island, the Canaries, Cape Verde and the Bermudas.

Genus **AGABIFORMIUS** Verhoeff, 1908

Agabiformius lentus (Budde-Lund, 1885)

Agabiformius lentus; VANDEL 1954a: 74; 1962: 640, figs 315-316.

MATERIAL EXAMINED. — 1 ♀, Cardo (W of Bastia), leg. S. Taiti and A. Poggesi, 27.VI.1984.

PREVIOUS RECORDS. — Corsica (VANDEL 1954a); Sisco (VANDEL 1962).

DISTRIBUTION. — This species is very common in all the lands of the Mediterranean basin. It has been introduced by man to Madeira Island, the Canaries, Senegal, Oman, Seychelles, China, Mexico, Haiti, Venezuela, Bermudas and Hawaiian islands. It has also been recorded from greenhouses in England.

Genus **LUCASIUS** Kinahan, 1859

Lucasius pallidus (Budde-Lund, 1885)

Lucasius pallidus; VANDEL 1954a: 74.
Lucasius pallidus pallidus; VANDEL 1962: 651, figs 320-321.

MATERIAL EXAMINED. — Many ♂♂ and ♀♀ collected from the following localities: valley below chapelle Pianelli, between Casalabriva and Olmeto; mouth of Rizzanèse river, S of Propriano; Monte Rosso, SE of Sarlène.

PREVIOUS RECORDS. — Corsica (VANDEL 1954a).

DISTRIBUTION. — Portugal, Spain, southern France, Morocco, Corsica, Sardinia and Tuscany.

Source : MNHN, Paris

Genus **PORCELLIO** Latreille, 1804

Porcellio spatulatus Costa, 1882
(Fig. 19)

Porcellio latissimus; BUDDE-LUND 1885: 95, 302; DOLLFUS 1887: 10; 1899: 188; ?SCHARFF 1894: 163.

Porcellio spatulatus; ARCANGELI 1925: 15, pl. 4, figs 1-2; VANDEL 1954a: 73; 1962: 660; LANZA 1979: 49; CASSOLA 1982: 654; LANZA & POGGESI 1986: 66, 71, 121, 177, 178, 179, 180, 182, 184, 185.

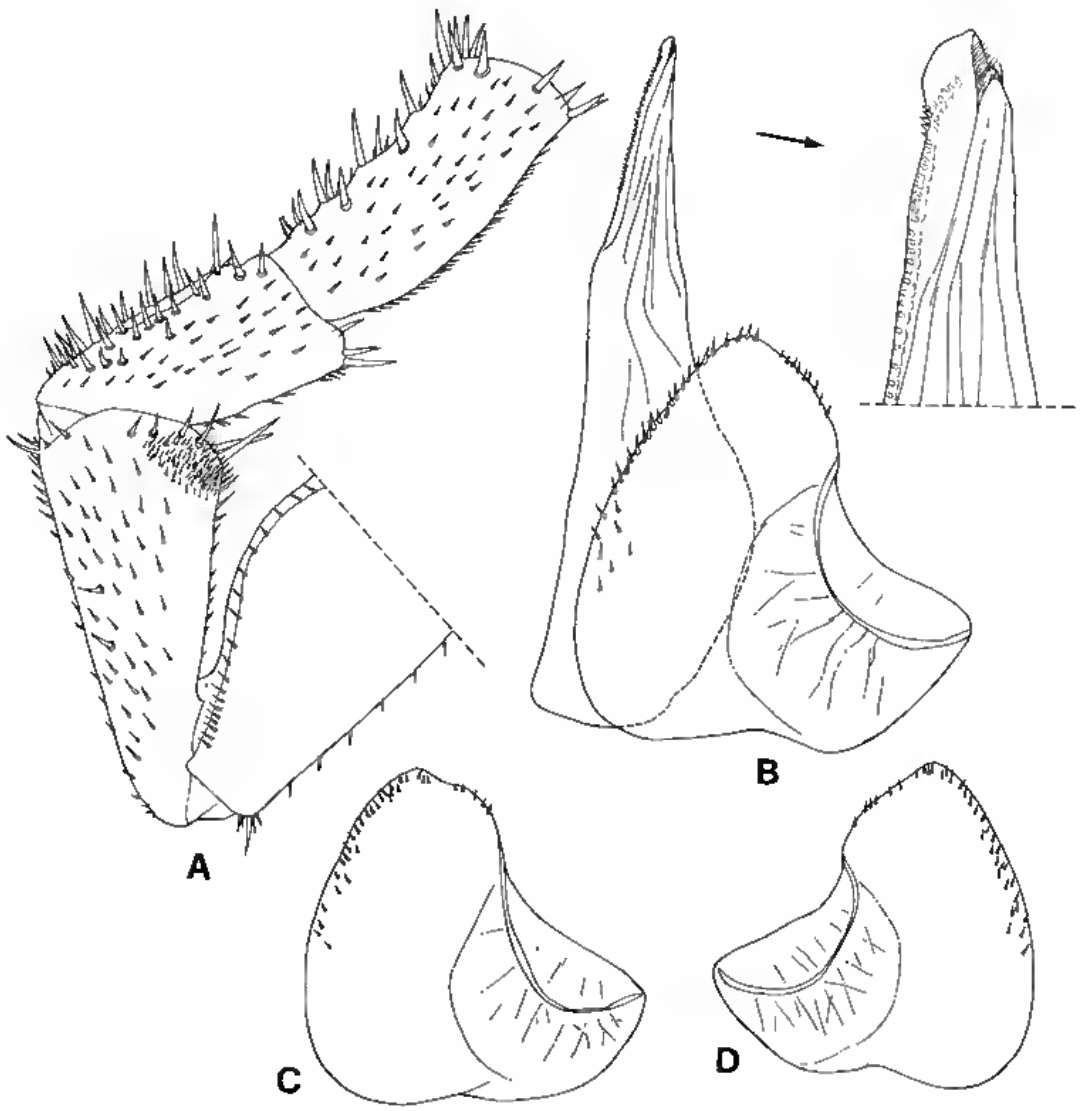


FIG. 19. — *Porcellio spatulatus*, ♂: A, pereopod 7; B, pleopod 1; C, D, pleopod 1 exopod in other specimens.

Source : MNHN, Paris

Porcellio (Polyplatus) spatulatus; ARCANGELI 1950: 90.

MATERIAL EXAMINED. — Many ♂♂ and ♀♀ collected from the following localities: near Tizzano (SW of Sartène); Capo Pertusato (SE of Bonifacio); île de Cornuta (golfe de San Cipriano); îlot La Folaca (near Palombaggia, SE of Porto-Vecchio); rocher de Vacca (Cerbicale); île Pietricaggiosa (Cerbicale); îlot Toro Grande; îlot Toro Piccolo; îlot Porraggia Piccola and îlot Porraggia Grande (N of île Cavallo); grand îlot des Bruzzi (W of golfe de Figari); îlot Fazzuolo Piccolo (NW of Bonifacio); rocher sud de Ratino (W of île Cavallo); île Saint-Antoine (Capo Pertusato, SE of Bonifacio).

PREVIOUS RECORDS. — Corsica and île Lavezzi (BUDDE-LUND 1885; ARCANGELI 1925, 1950); ? Corte (SCHARFF 1894); île Saint-Antoine (LANZA 1979; LANZA & POGGESI 1986); île de Cornuta, rocher de Vacca, île Pietricaggiosa, îlot Toro Grande, îlot Toro Piccolo, îlot La Folaca, îlot Porraggia Piccola, îlot Porraggia Grande, rocher sud de Ratino, île Lavezzi, îlot Fazzuolo Piccolo, grand îlot des Bruzzi (LANZA & POGGESI 1986).

DISTRIBUTION. — Southern Corsica, Sardinia and northern Tunisia (*ca* 28 km N of Sousse, unpublished datum).

REMARKS

In Corsica this species is strictly littoral. Thus, the record from Corte (SHARFF 1894) most probably is due to a misidentification or a mislabelling of the locality.

The male characters of this species are illustrated in Fig. 19.

Porcellio scaber Latreille, 1804

MATERIAL EXAMINED. — 2 ♂♂, 2 ♀♀, near Tizzano, SW of Sartène, leg. S. Taiti, 15.V.1982.

DISTRIBUTION. — Cosmopolitan species.

Porcellio dilatatus dilatatus Brandt, 1833

Porcellio dilatatus; SCHARFF 1894: 163; REMY 1950: 6, 7, 9; VANDEL 1953a: 164; 1954a: 74; BERON 1972a: 12.

MATERIAL EXAMINED. — Many ♂♂ and ♀♀ collected from the following localities: near Meria; marine de Giottani (between Nonza and Centuri-Port); near Ponticello (near Pietracorbara); St-Léonard (W of marine de Pietracorbara); Sta Catterina, N of marine de Sisco; grotte de Sisco; near Crosciano along Sisco river; grotte de Brando and environs; Sto Pietro-di-Tenda; grotte de Sabara (Castiglione).

PREVIOUS RECORDS. — Ajaccio (SCHARFF 1894); grottes de Sisco and Brando (REMY 1950; VANOEL 1953a; BERON 1972a); grottes de Sabara, Cabanuli (Omessa), Sisco II, Ostriago (Pietracorbara) and Manuel-Ange (Lozzi) (BERON 1972a).

DISTRIBUTION. — Known from all Europe but rare at the east of the Italian peninsula. It has been introduced to North and South America, Sri Lanka and Hawaii.

Porcellio laevis Latreille, 1804

Porcellio laevis; SCHARFF 1894: 163; VERHOEFF 1926: 263; VANDEL 1953a: 164; 1954a: 74; BERON 1972a: 13; LANZA & POGGESI 1986: 121, 182.

? *Porcellio ragusae*; VERHOEFF 1926: 263; VANDEL 1954a: 73; 1962: 660.

Source : MNHN, Paris

MATERIAL EXAMINED. — Many ♂♂ and ♀♀ collected from the following localities: Tollare (Cap Corse); marine de Pietracorbara; marine de Sisco; Casta (SW of St Florent); défilé de Lancone; Folelli, along Fium Alto; Ghisonaccia; Porticcio; valley below chapelle Pianelli, between Casalabriva and Olmeto; mouth of Rizzanèse river, SW of Propriano; Bocca Albitrina, W of Sartène; Monte Rosso, SE of Sartène; Tizzano, SW of Sartène; dolmen de Fontanaccia and menhir de Renaggiu, S of Sartène; Bonifacio; île de la Giraglia; île Lavezzi.

PREVIOUS RECORDS. — Bastia and St-Florent (SCHARFF 1894); road from Biguglia to St-Florent, Sagone (VERHOEFF 1926); grotte de St-Francois (Bonifacio) (VANOEL 1953a; BERON 1972a); île Lavezzi (LANZA & POGGESI 1986).

DISTRIBUTION. — Cosmopolitan species.

REMARKS

On the basis of a re-examination of the types of *Porcellio ragusae* Dollfus, 1896, CARUSO & LOMBARDO (1982: 26) demonstrated this species to be a junior synonym of *P. laevis*. Most probably also the record of *P. ragusae* from Corsica refers to *P. laevis*.

Porcellio orarum vizzavonensis Verhoeff, 1928
(Fig. 20)

Porcellio variabilis (= *P. transmutatus*); DOLLFUS 1899: 188.
Porcellio lugubris vizzavonensis; VERHOEFF 1926: 263 (*nomen nudum*); 1928: 123.
Porcellio (Porcellio) Verhoeffi; ARCANGELI 1950: 87.
Porcellio orarum vizzavonensis; VANDEL 1951: 159, fig. 32; 1954a: 74; 1962: 731, figs 350, 352D-E; TAITI & FERRARA 1980: 282; LANZA & POGGESI 1986: 121, 170, 175, 176, 177, 178, 179, 181, 183, 185, 186, 187, 188.

MATERIAL EXAMINED. — Many ♂♂ and ♀♀ collected from the following localities: Capo Grosso, Tollare, Barcaggio and pond between Barcaggio and Punta di Agnello (Cap Corse); marine de Giottani (between Nonza and Centuri-Port); phare de Fornali, W of St-Florent; near Capo a u Cavallo (SW of Calvi); near grotte de Pietralbello, S of Moltifao; Folelli, along Fium Alto; Haut-Asco; forêt de Carozzica (near Haut-Asco); near Asco; Francardo; near Caporalino; N slope of Monte Cinto; W slope of Monte Cinto near refuge Altare; Cala Maiora, anse de Gattoia (W of Girolata); Prunete (E of Cervione); plage de Caspio (NW of Porto); col de Vergio (NE of Evisa); Porto; lac de Melo and lac de Capitello (Restonica river valley); Restonica river valley; Vecchio river valley (S of Venaco); near Ghisoni; col de Vizzavona; Capannelle (SE of Vizzavona); lac de Vitelaca (upper valley of Prunelli river); Punta de la Parata, W of Ajaccio; below Punta di Boccarona, along Solenzara river; 3 km N of col de la Vaccia (N of Aullène); col de Bavella and environs; foot of Punta Velaco (S of Bavella); Fautea (between Solenzara and Porto-Vecchio); Lovo Santo, swamp at mouth of Cavo river; valley below chapelle Pianelli between Casalabriva and Olmeto; S of Orone (W of l'Ospedale); Barrage de l'Ospedale; Taglio Rosso, W of Ste-Lucie-de-Porto-Vecchio; baie d'Avena, SW of Sartène; golfe de Sant'Amanza; near Ermitage de la Trinité (NW of Bonifacio); old fortress near Capo Pertusato (SE of Bonifacio); Capo Pertusato; île de la Giraglia; îlot Terre and îlot Finocchiarola (N of Macinaggio); îlot Nord de Morsetta (N of Galéria); îlot Porri and rochers d'Elpa Nera (W of Stolli, golfe de Girolata); îlot Palazzinu and îlot Palazzu (N of Punta Palazzo); îlot Garganellu (near île Gargalu, S of Punta Palazzo); Zeccu d'a Furmicula (golfe d'Elbo); îlot Guardiola (SW of Porto); île de Cala d'Alga (Sanguinaires); île Mezzu Mare (Sanguinaires); île Piana de Portigliolo (golfe d'Ajaccio); îlot Fautea; îlot de la Roscana (golfe de Pinarello); île de Pinarello; îlot La Folaca (near Palombaggia, SE of Porto-Vecchio); rocher de Vacca and île Pietricaggiosa (Cerbicale); îlot Toro Grande; îlot Toro Piccolo; grand îlot des Bruzzi (NW of golfe de Figari); île Cavallo; îlot Luigi Giafferri (N of île Lavezzi); îlot Silene (NW of île Lavezzi); île Lavezzi.

PREVIOUS RECOROS. — Vizzavona (VERHOEFF 1926, 1928); Sargone (VERHOEFF 1928); Corsica (VANDEL 1962); mouth of Cavo river, Fautea, Velaco, Diamante (TAITI & FERRARA 1980); île de la Giraglia, îlot Terre, îlot Finocchiarola, îlot Fautea, îlot de la Roscana, île de Pinarello, rocher de Vacca, île Pietricaggiosa, îlot Toro Grande, îlot

Source : MNHN, Paris

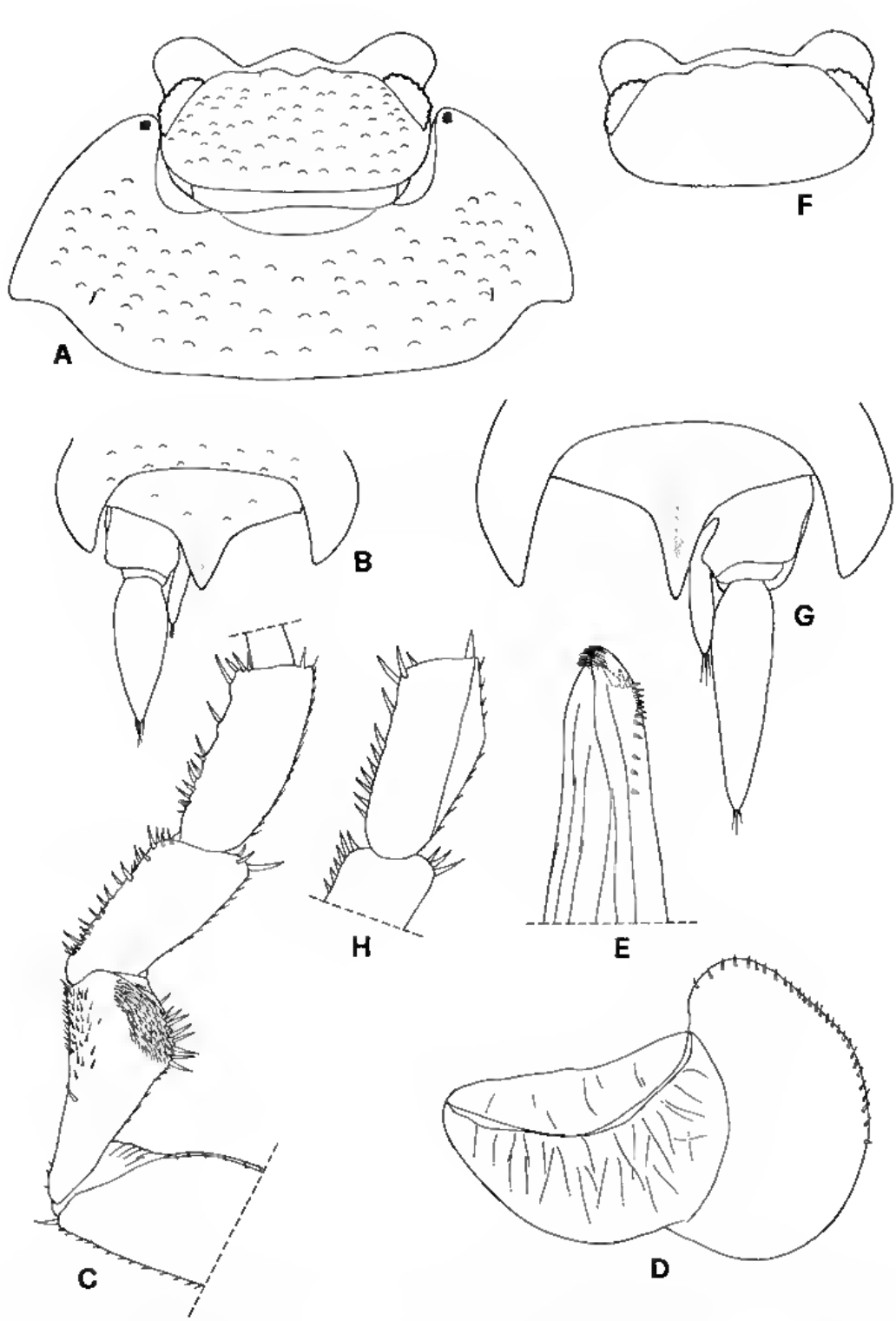


FIG. 20. — *Porcellio orarum vizzavonensis*, specimens from Punta de la Parata: A, cephalon and pereonite 1; B, telson and left uropod; C, ♂ pereopod 7; D, ♂ pleopod 1 exopod; E, distal part of ♂ pleopod 1 endopod. Specimens from Asco river valley: F, cephalon; G, telson and right uropod. Specimen from Orone environs: H, ♂ pereopod 7 carpus.

Source : MNHN, Paris

Toro Piccolo, îlot La Folaca, île Cavallo, îlot Luigi Giafferri, îlot Gian Pietro Gaffori, îlot Silene, grand îlot des Bruzzi, île Piana de Portigliolo, île Mezzu Mare, île de Cala d'Alga, îlot de Cala Maiora, îlot Garganellu, îlot Palazzinu, îlot Porri, îlot Nord de Morsetta (LANZA & POGGESI 1986).

DISTRIBUTION. — Known from Corsica and some islets around Sardinia (ARGANO & MANICASTRI 1991).

REMARKS

The large number of specimens examined permits some morphological observations on this taxon:

a, the maximum length is 15 mm for the male and 21 mm for the female (13 mm according to VANDEL 1951);

b, the shape of both cephalon and telson is very variable, also within the same population;

c, dorsal granulations are in general feeble, but in some specimens they are well developed;

d, the male pereopod 7 ischium has a setose area, the tergal margin of the carpus is usually not or only slightly humped, also in very large specimens.

The variability found in the Corsican populations shows that the systematics of the *orarum*-group is still unclear and a re-examination of the different subspecies (see VANDEL 1962) is necessary. Moreover, in central-southern Italy there is a form of this group which was considered to be a subspecies of *P. orarum* Verhoeff, 1910 (*P. orarum verhoeffi* Dahl, 1916) (FERRARA & TAITI 1978; TAITI & FERRARA 1980), but which certainly refers to *Porcellio pumicatus* Budde-Lund, 1885 (TAITI & FERRARA 1989a). Thus, *P. orarum* should be a junior synonym of *P. pumicatus*. Since we have not examined any specimen referable to the typical *P. orarum*, while awaiting a complete analysis of all the forms in this group, we prefer to reserve the name *pumicatus* only for the Italian taxon.

Porcellio lamellatus sphinx (Verhoeff, 1931)

Porcellio lamellatus; DOLLFUS 1899: 188; VANDEL 1954a: 74.

Porcellio lamellatus sphinx; VANDEL 1962: 744, figs 357-358A, D-F; LANZA & POGGESI 1986: 121, 176, 185.

MATERIAL EXAMINED. — Many ♂♂ and ♀♀ collected from the following localities: Barcaggio (Cap Corse); anse de Faggiola (désert des Agriates); Calzarello (SE of Ghisonaccia); baie d'Avena (SW of Sartène); Punta di Fautea (between Solenzara and Porto-Vecchio); Golfo di Sogno (NE of Porto-Vecchio); Capo Pertusato (SE of Bonifacio); îlot terre and îlot intermédiaire (near îlot Finocchiarola, N of Macinaggio); île Piana de Portigliolo (golfe d'Ajaccio).

PREVIOUS RECORDS. — Étang de Biguglia (DOLLFUS 1899); îlot terre, îlot intermédiaire, île Piana de Portigliolo (LANZA & POGGESI 1986).

DISTRIBUTION. — This littoral subspecies occurs in the eastern Iberian Peninsula, southern France, Corsica, Sardinia, Italy and Dalmatia.

REMARKS

SCHMALFUSS (1992: 4, 12) suggests to transfer *P. lamellatus* to the genus *Proporcellio* Verhoeff, 1907, on the basis of the clear likeness of this species with *Proporcellio quadriseriatus* Verhoeff, 1917. On the contrary, in an electrophoretic analysis of some species of *Porcellio*

Source : MNHN, Paris

including *P. lamellatus*, VIGLIANISI *et al.* (1992) show that the genetic distance of this species falls within the range of the genus. Thus, we prefer to keep this taxon in *Porcellio*.

Family ARMADILLIDIIDAE
Genus **ALLOSCHIZIDIUM** Verhoeff, 1919

Alloschizidium was erected by VERHOEFF (1919) as a subgenus of *Armadillidium* Brandt, 1833 to include *Armadillidium pruvoti* Racovitza, 1907, from a cave in the French Maritime Alps. It was later considered by the same author (VERHOEFF 1933a) to be a subgenus of *Troglarmadillidium* Verhoeff, 1900, and finally by VERHOEFF (1933b) and ARCANGELI (1948) to be a full genus.

VANDEL (1944a, 1954d, 1962) divided the family Armadillidiidae into two subfamilies on the basis of cephalic structure: Eluminae, with eleven genera, caracterized by a cephalon with no postscutellar line[1], and Armadillidiinae, including the sole genus *Armadillidium*, with a cephalon bearing such a line. According to VANDEL (1954d), since the postscutellar line is present in *A. pruvoti*, this species has to be in *Armadillidium*, of which consequently *Alloschizidium* was considered to be a junior synonym. The presence of a schisma at the posterior comers of pereonite 1 justified only the institution of a group of species (the *pruvoti*-group), which included *A. pruvoti* (with the typical form and a Corsican form), *A. mateui* Vandel, 1953 and *A. racovitzai* Vandel, 1954.

Examination of many specimens belonging to the Corsican form of *A. pruvoti* shows that this taxon represents a distinct species, even if morphologically very close to *A. pruvoti*, which cannot be placed in *Armadillidium*. Moreover, it seems difficult to include this species in a subfamily (Armadillidiinae) different from the other species ascribed by VANDEL himself to the Eluminae (*e.g.* considering only the Corsican fauna, *Paraschizidium remyi* Vandel, 1944).

Some questions arise from the above considerations:

— Is *A. pruvoti* a real *Armadillidium* and therefore *Alloschizidium* is synonymous with *Armadillidium*?

— Does *Paraschizidium remyi*, apparently so similar to *A. pruvoti*, belong to a different genus and subfamily?

— In general, what is the validity of morphologically very close genera such as *Paraschizidium* Verhoeff, 1919, *Typhloschizidium* Arcangeli, 1933 and *Nesolidium* Verhoeff, 1941?

In order to clarify the taxonomic status of the Corsican species, we examined the following species, also using the scanning electron microscope: *Armadillidium pruvoti* "forme de Corse" (*sensu* Vandel); *Paraschizidium coeculum* (Silvestri, 1897), of which the type species *P. olearum* Verhoeff, 1919, is a junior synonym (MANICASTRI & TAITI 1994); *P. olearum sensu* Vandel, 1962 *nec* Verhoeff, 1919; *P. remyi*; *Typhloschizidium sardoum* Arcangeli, 1933, type species of the genus; *T. igiliense* Ferrara & Taiti, 1978; *T. cottarellii* Argano & Pesce, 1974; and *Nesolidium buchnerorum* Verhoeff, 1941, type species of the genus (type specimens from Ischia Island).

1. According to VANDEL (1944a, 1954d, 1962) the postscutellar line is a neoformation. On the contrary, SCHMALFUSS (1989: 209) states that this line is probably homologous to the frontal line in other families. Though the latter opinion is certainly more likely, we prefer to keep using VANDEL's terminology, awaiting a specific study on this matter.

Source : MNHN, Paris

The following results emerged:

— *P. coeculum* and *P. olearum sensu* Vandel have a very simple cephalon, *i.e.* with a scutellum laterally defined only by the antennary depressions and superiorly with no distinct margin, and with a rudimentary postscutellar line. Moreover the antennule consists of two articles and the posterior corners of pereonite 1 are not cleft. In our opinion *Paraschizidium* is a valid genus and includes with certainty these two species. All the other species presently in *Paraschizidium* must be re-examined to define their correct taxonomic status. Certainly the Greek species described in this genus by SCHMALFUSS (1981) and SFENTHOURAKIS (1992; 1995) do not belong to *Paraschizidium* since they lack a postscutellar line, the scutellum is well defined on all its sides and the posterior corners of pereonite 1 are distinctly cleft.

— *Armadillidium pruvoti* "forme de Corse", *Paraschizidium remyi*, *Typhloschizidium igiliense*, *T. cottarellii* and *N. buchnerorum* possess a cephalon with distinct postscutellar and frontal lines and a well-defined scutellum (in *T. cottarellii* and *N. buchnerorum* the superior margin is interrupted in the middle), pereonite 1 with a schisma at the posterior corners, and the antennule with three articles. In our opinion, these species constitute a homogeneous group, clearly different from *Armadillidium*, characterized by the ability to roll up in the form of a lengthened ovoid (as in *Paraschizidium*), the cephalon with antennary lobes directed frontwards and distinct postscutellar and frontal lines, antennule of three articles and pereonite 1 with schisma. For all these species we propose to revalidate the genus *Alloschizidium*, of which *Nesolidium* is a junior synonym.

— *Typhloschizidium sardoum* apparently differs from the above-mentioned species in lacking the frontal line, while it shares all the other characters. The lack of the frontal line is certainly a secondary feature caused by the very deep concavity of the antennary depressions. In fact, a species from a cave in southern Tuscany (*Alloschizidium cavernicolum* Taiti & Ferrara, 1995), morphologically very close to *T. sardoum*, shows the antennary depressions with concavities slightly less marked and both lines (postscutellar and frontal) still present and very close to each other (TAITI & FERRARA 1995b). In conclusion, also *T. sardoum* must be included in *Alloschizidium*, of which *Typhloschizidium* is a junior synonym.

At present, *Alloschizidium* includes the following species (TAITI & FERRARA 1995b): *A. pruvoti*, *A. campanellii* n.sp. (= *A. pruvoti* "forme de Corse" *sensu* Vandel), *A. racovitzai*, *A. igiliense*, *A. remyi*, *A. cottarellii*, *A. buchnerorum*, *A. sardoum*, *A. eeae* (ARGANO & UTZERI 1973) and *A. cavernicolum*.

Alloschizidium campanellii n.sp.
(Figs 21, 22, 27)

Armadillidium Pruvoti; VANDEL 1954a: 74; 1954d: 54, fig. 4 (*partim*: specimens from Corsica).

Armadillidium pruvoti "forme de Corse"; VANDEL 1962: 785, fig. 379.

MATERIAL EXAMINED. — 1 ♂ holotype (MZUF), 14 ♂♂, 19 ♀♀ paratypes (MZUF), 2 ♂♂, 2 ♀♀ paratypes (MNHN-Is4097), Tizzano (SW of Sartène), ilex grove, leg. S. Taiti and S. Campanelli, 15.V.1982; 2 ♂♂, 5 ♀♀ paratypes (MZUF), valley below chapelle Pianelli, between Casalabriva and Olmeto, leg. S. Taiti and

Source : MNHN, Paris

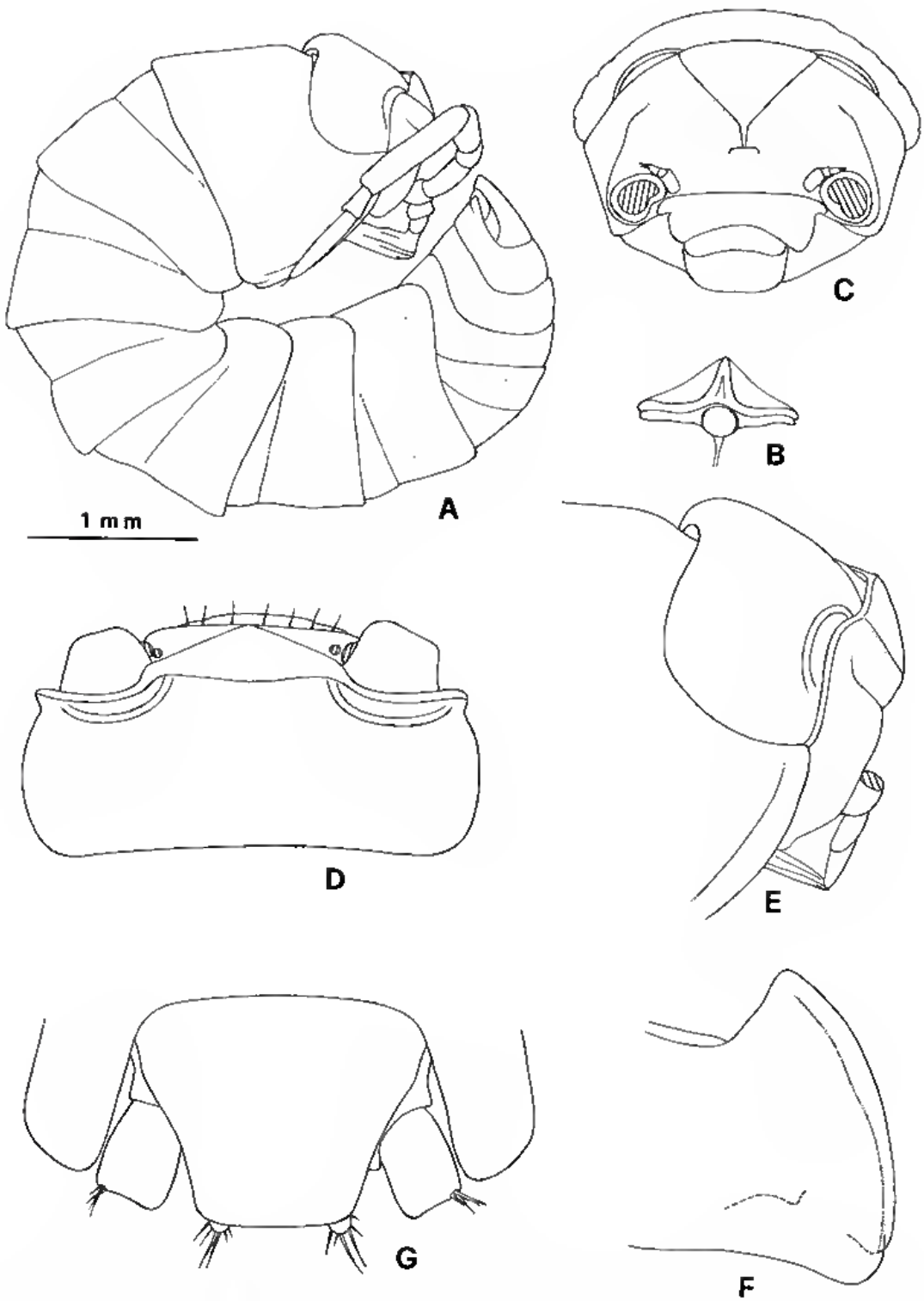


FIG. 21. — *Alloschizidium campanellii* n.sp.: A, adult ♀, lateral; B, dorsal scale-spine; C, cephalon, frontal, D, cephalon, dorsal; E, cephalon, lateral; F, right epimeron of pereonite 1, dorsal; G, telson and uropods.

Source : MNHN, Paris

S. Campanelli, 22.X.1982; 6 ♂♂, 21 ♀♀ paratypes (MZUF), Monte Rosso (SE of Sartène), meadow near ilex grove, leg. S. Taiti and S. Campanelli, 20.X.1982; 1 ♂ paratype (MZUF), same data, ilex grove.

Previous records. — Ste-Lucie-de-Porto-Vecchio, Bonifacio, Sartène and environs, Ajaccio and environs (Vandel 1954d, 1962).

Etymology. — The new species is named after our friend S. Campanelli for his invaluable help in collecting the specimens.

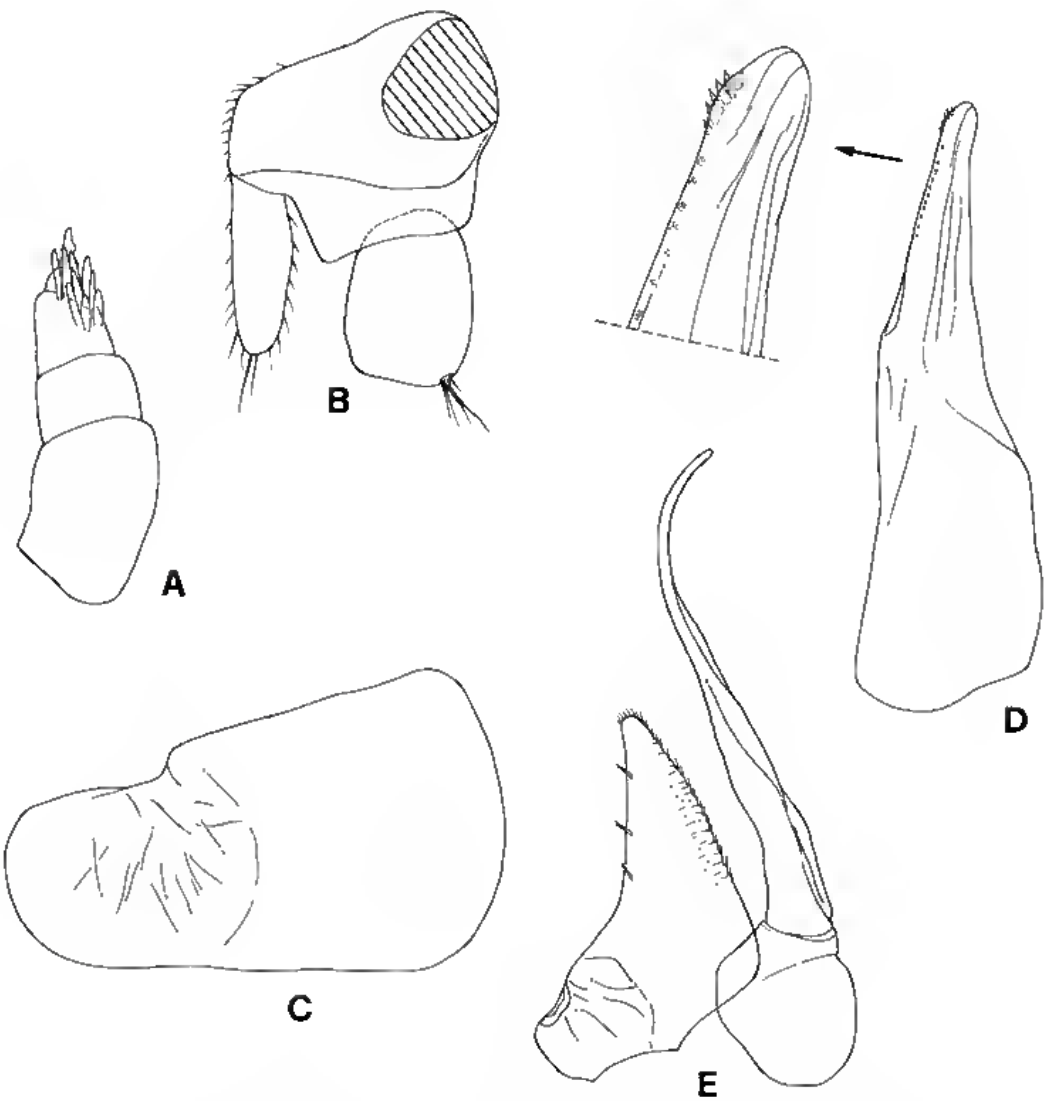


Fig. 22. — *Alloschizidium campanellii* n.sp., ♂: A, antennule; B, uropod; C, pleopod 1 exopod; D, pleopod 1 endopod; E, pleopod 2.

Source : MNHN, Paris

DESCRIPTION

Maximum diameter of the animal when rolled up: ♂, 3 mm; ♀, 3.5 mm.

Colourless body, eye absent. Dorsum smooth, covered with many tiny triangular scale-spines. Body strongly convex with vertical epimera, able to roll up into a perfect ball. Cephalon with triangular scutellum, very wide superiorly, bent over vertex but clearly separated and protruding from it; postscutellar line semicircular on both sides; antennary lobes quadrangular, directed frontwards. Pereonite 1 with posterior margin slightly sinuous; posterior corners bearing a schisma with external lobe distinctly protruding backwards compared with the inner one; a light depression along the whole lateral margin. Telson trapezoidal, slightly broader than long. Antennule of three articles with a tuft of superimposed aesthetascs at apex. Antenna with second flagellar article three times as long as first. Uropodal exopod longer than wide.

Male

Pleopod 1 exopod subrectangular, with no distinct posterior point; endopod with thickset distal part, rounded apex. Pleopod 2 as in Fig. 22E.

REMARKS

These specimens undoubtedly correspond to those from Corsica identified by VANDEL (1954a, 1954d, 1962) as *Armadillidium pruvoti*. According to the French author, the morphological differences between the Corsican population and the typical one are due to the subadult stage of the specimens observed. However, the abundant material examined by us, including male specimens of similar size to that of the typical *A. pruvoti*, shows that the differences noticed by VANDEL are constant and do not depend on the age of the specimens. Thus, the Corsican population belongs to a distinct species of the genus *Alloschizidium* together with the closely related *A. pruvoti*.

Alloschizidium campanellii differs from *A. pruvoti* in the shape of the telson with a broader basal part, uropodal exopod narrower and longer, male pleopod 1 exopod with no distinct posterior point. In cephalic structure *A. campanellii* resembles *A. remyi*, from which it is readily distinguished by the triangular instead of piliform dorsal scale-spines, the longer telson and uropodal exopod.

Alloschizidium remyi (Vandel, 1944) n. comb.
(Figs 23, 24, 27)

Paraschizidium Remyi Vandel, 1944a: 84, figs I-IV; 1954a: 74; ARCANGELI, 1948: 258.
Paraschizidium remyi; VANDEL 1962: 766, figs 367-368.

MATERIAL EXAMINED. — 1 ♀, grotte de Sisco, leg. S. Taiti, S. Vanni and A.M. Nistri, 3.IV.1995; 1 ♀, Cardo (W of Bastia), humus under ilex tree, leg. F. Bernini, 19.IV.1980; 2 ♂♂, 3 ♀♀, same locality, leg. S. Taiti and A. Poggesi, 25.VI.1984.

PREVIOUS RECORDS. — Convent of Ste-Catherine-de-Sisco (VANDEL 1944a).

DISTRIBUTION. — Species endemic to Corsica.

Source : MNHN, Paris

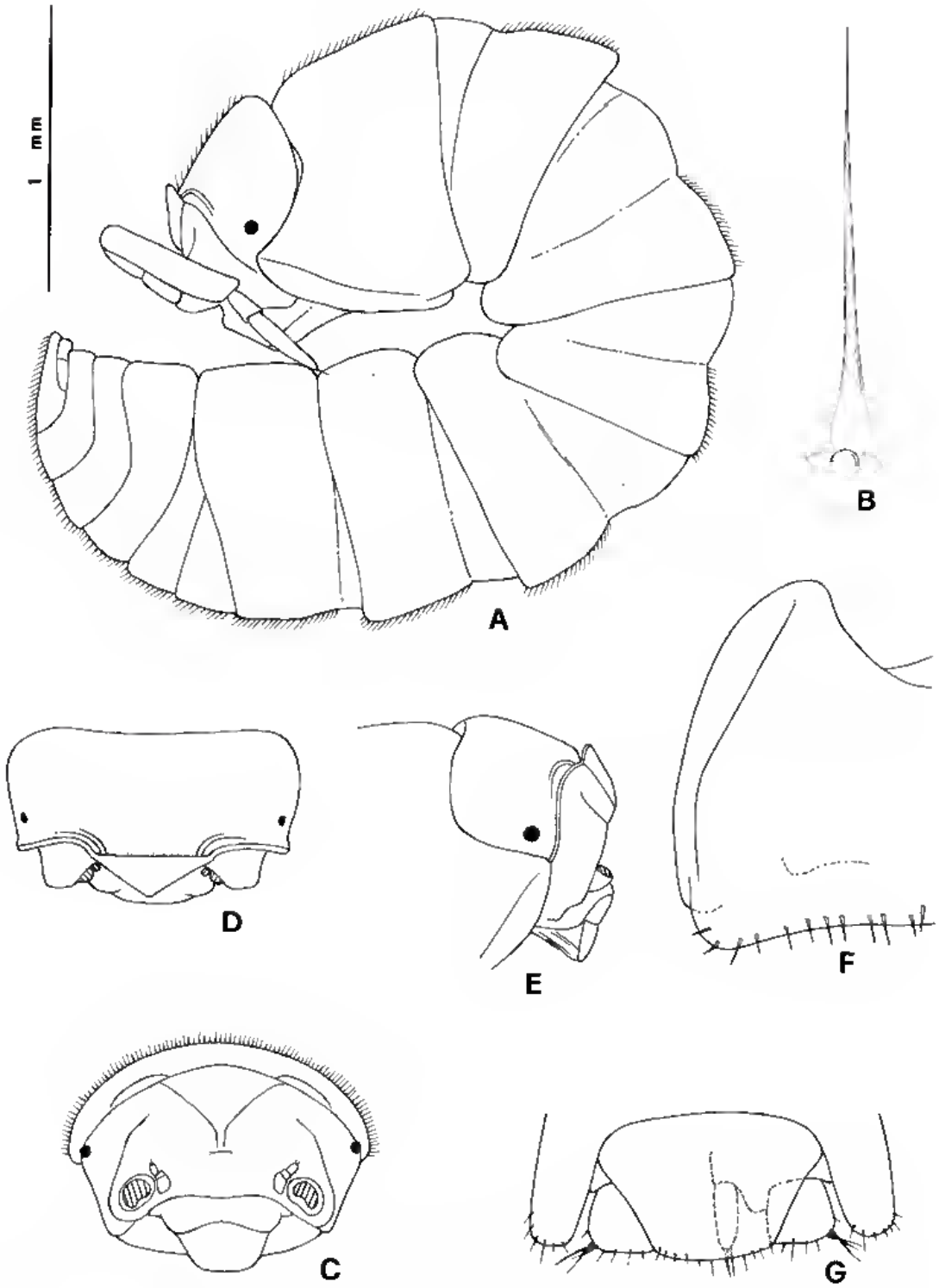


FIG. 23. — *Alloschizidium remyi*: A, adult ♀, lateral; B, dorsal scale-spine; C, cephalon, frontal; D, cephalon, dorsal; E, cephalon, lateral; F, left epimeron of pereonite 1, dorsal; G, telson and uropods.

Source : MNHN, Paris

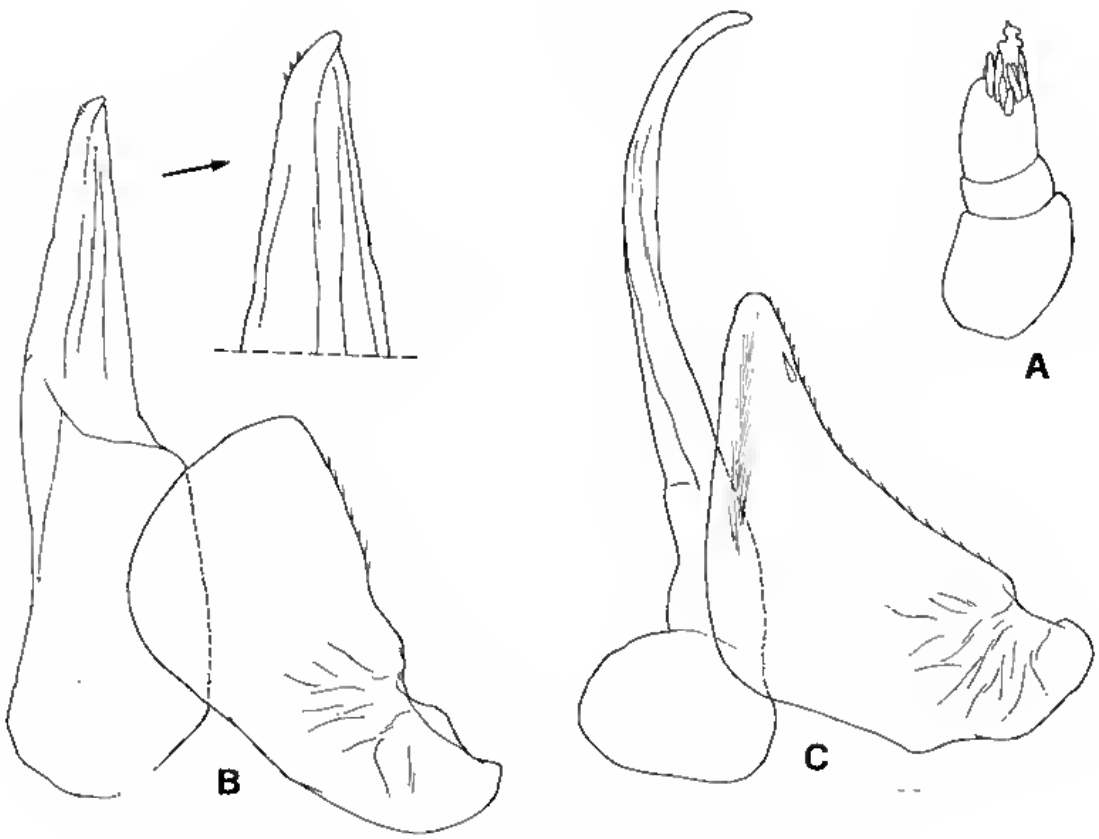


FIG. 24. — *Alloschizidium remyi*: A, antennule; B, ♂ pleopod 1; C, ♂ pleopod 2.

REMARKS

On the basis of the presence of a posiscutellar line, schisma at the posterior corners of pereonite 1 and antennule with three articles, this species belongs to the genus *Alloschizidium* and not to *Paraschizidium*. The main diagnostic features of this species, including the previously unknown male characters, are illustrated in Figs 23, 24.

Alloschizidium cottarellii (Argano & Pesce, 1974) n. comb.
(Figs 25, 27)

MATERIAL EXAMINED. — 1 ♀, Punta de la Parata (W of Ajaccio), leg. S. Taiti, 14.V.1982; 2 ♀♀, 1 juv., same locality, leg. S. Taiti and S. Vanni, 8.III.1994; 5 ♀♀, 1 juv., between Cauro and Bocca di San Giorgio (E of Ajaccio), ilex grove, leg. S. Taiti, 14.V.1982; 10 ♂♂, 12 ♀♀, between Pietrosella and Fogolina (SE of Porticcio), ilex and arbutus grove, leg. S. Taiti and S. Campanelli, 21.X.1982; 7 ♀♀, forêt de Valle Mala, near col de St-Eustache (between Petreto-Bicchisano and Aullène), leg. S. Taiti and S. Campanelli, 22.X.1982; 1 ♀, near Punta di u Carapono (Coti-Chiavari), leg. S. Taiti and S. Campanelli, 21.X.1982; 3 ♂♂, 5 ♀♀, Capo

Source : MNHN, Paris

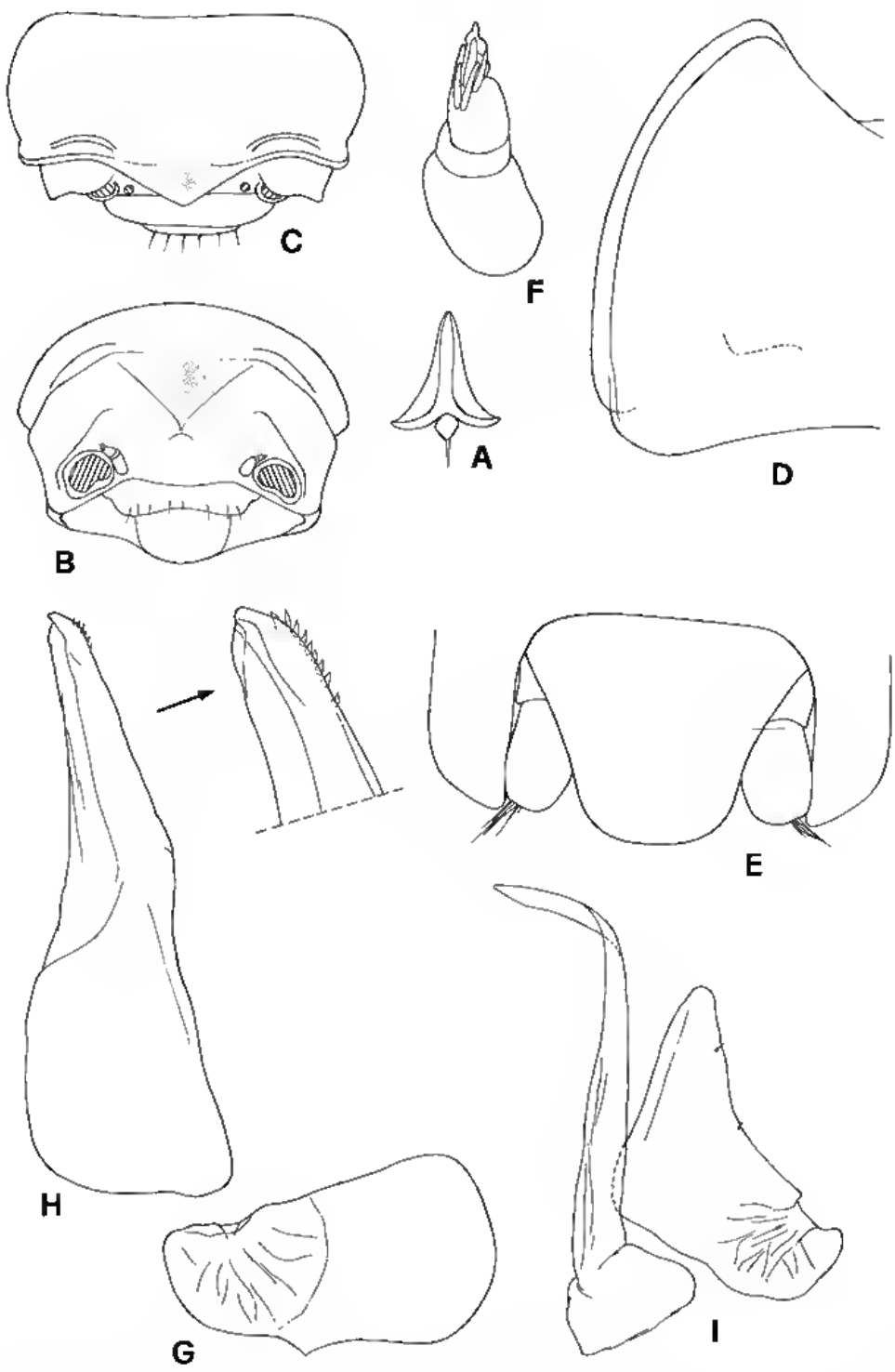


FIG. 25. — *Alloschizidium cottarelli*: A, dorsal scale-spine; B, cephalon, frontal; C, cephalon, dorsal; D, left epimeron of pereonite 1, dorsal; E, telson and uropods; F, antennule; G, ♂ pleopod 1 exopod; H, ♂ pleopod 1 endopod; I, ♂ pleopod 2.

Source : MNHN, Paris

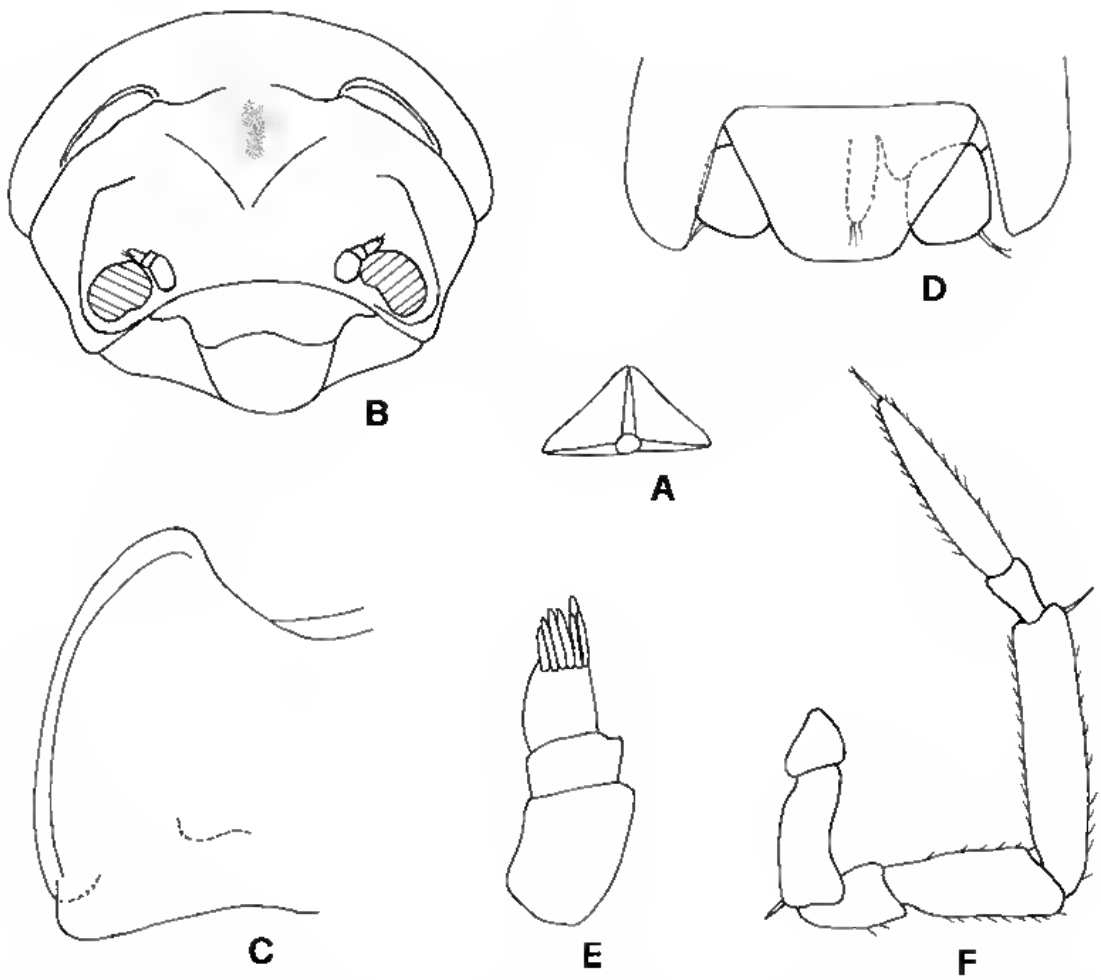


FIG. 26. — *Alloschizidium buchnerorum*: A, dorsal scale-spine; B, cephalon, frontal; C, left epimeron of pereonite 1, dorsal; D, telson and uropods; E, antennule; F, antenna.

Pertusato (SE of Bonifacio), leg. S. Taiti, 18.V.1982; 1 ♀, same locality, leg. S. Taiti and S. Campanelli, 19.X.1982; 1 ♂, 1 ♀, same locality, leg. S. Taiti, 29.VI.1991.

DISTRIBUTION. — Southern Corsica and northern Sardinia.

REMARKS

These specimens correspond well to the description by ARGANO & PESCE (1974) of *Typhloschizidium cottarellii* from Sardinia (Ardara, Sassari).

Due to the presence of a postscutellar line on the cephalon, this species is ascribed to the genus *Alloschizidium*. The main diagnostic characters of this species are illustrated in Fig. 25.

A. cottarellii is morphologically similar to *A. buchnerorum* (Verhoeff, 1941) from Ischia Island, from which it differs in the longer scale-spines on the dorsum, more broadly rounded

Source : MNHN, Paris

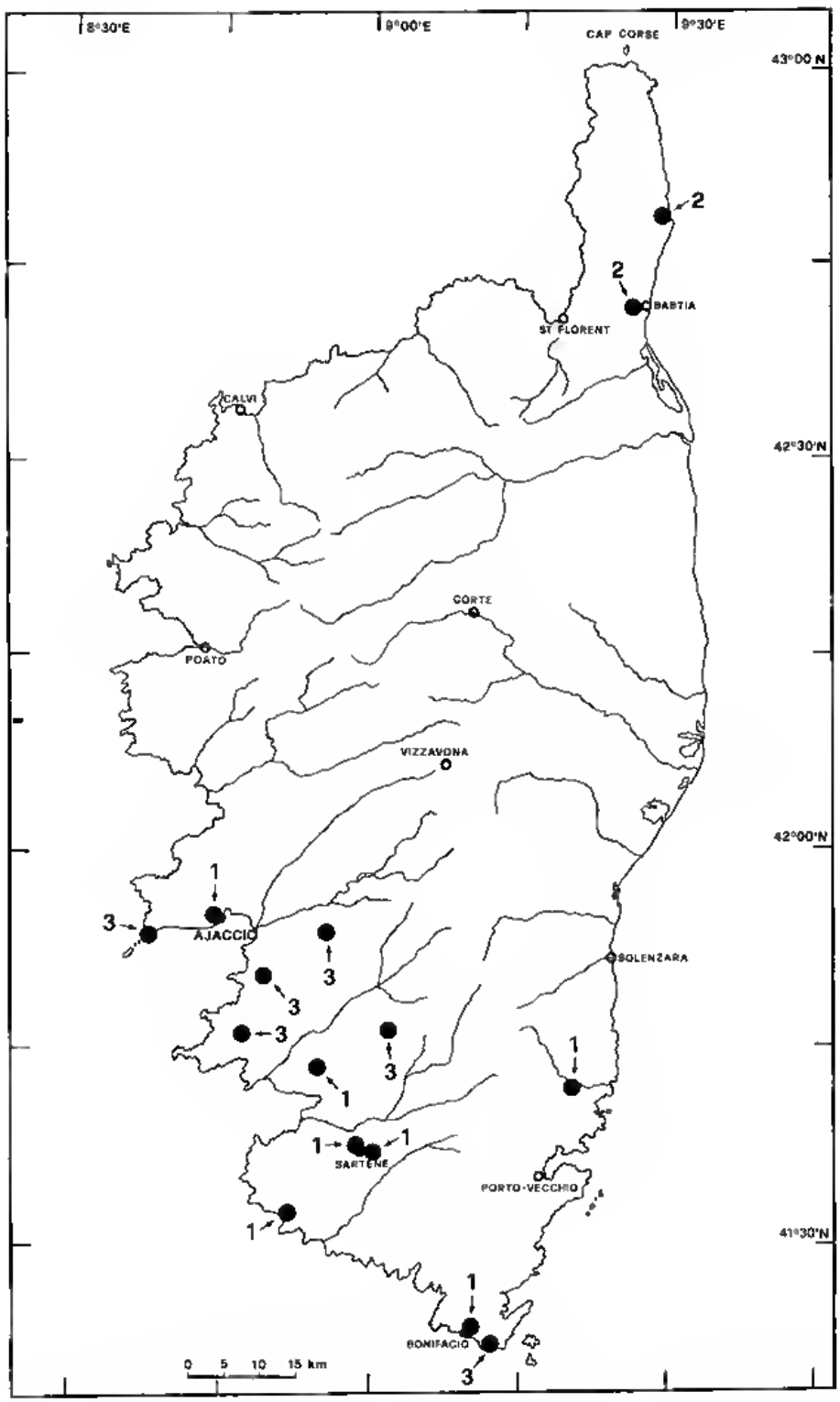


FIG. 27. — Distribution in Corsica of *Alloschizidium* species: 1, *A campanellii*; 2, *A remyi*; 3, *A cottarellii*.

Source : MNHN, Paris

posterior corners of pereonite 1, and longer telson and uropodal exopod. Re-examination of three syntypes (♀♀) of *A. buchnerorum*, in micropreparations deposited at the Zoologischen Staatssammlung, Munich, allowed us to illustrate the main characters of this species (Fig. 26).

Genus **ARMADILLIDIUM** Brandt, 1833

Armadillidium nasatum nasatum Budde-Lund, 1885
(Fig. 31)

Armadillidium nasatum; VANDEL 1954a: 74; 1962: 787, fig. 380.

MATERIAL EXAMINED. — 1 ♂, 1 ♀, 1 juv., Folelli, along Fium Alto, leg. P. Magrini, 5.XI.1983; many ♂♂ and ♀♀, same locality, leg. S. Taiti and A. Poggesi, 20.VI.1984.

PREVIOUS RECORDS. — Bonifacio (VANDEL 1962).

DISTRIBUTION. — Central-northern Italy, France, northern Spain, Netherlands, Great Britain and Ireland. It has also been introduced to the USA and recorded from many hothouses in Europe.

REMARKS

These specimens correspond perfectly to the nominal subspecies since they lack dorsal granulations, the cephalic scutellum is very protruding above the vertex with parallel sides and upper margin slightly concave, and the indentation at the base of the epimera on the posterior margin of pereonite 1 is slightly marked.

Armadillidium nasatum sardoum Arcangeli, 1950
(Fig. 31)

MATERIAL EXAMINED. — 1 ♂, Asco river valley, loc. Le Cabanelle, leg. S. Taiti and A. Poggesi, 20.VI.1984; 13 ♂♂, 6 ♀♀, Lovo Santo, swamp at mouth of Cavo river, leg. B. Lanza, VIII.1971; 15 ♂♂, 12 ♀♀, same locality, leg. S. Taiti, 10.VII.1978.

DISTRIBUTION. — Corsica and Sardinia.

REMARKS

These specimens differ from those of the preceding subspecies in the smaller size (ovigerous ♀ 13 mm long vs. 17 mm), the uniformly grey colour, the presence of tiny but clearly visible granulations on the dorsum, the cephalic scutellum less protruding with convergent sides and upper margin convex. On the basis of those characters they correspond to *A. nasatum sardoum* described by ARCANGELI (1950) from several localities in Sardinia.

Armadillidium granulatum Brandt, 1833

Armadillidium granulatum; DOLLFUS 1899: 186; ARCANGELI 1914: 467; VANDEL 1954a: 74; 1962: 796, fig. 383; LANZA & POGGESI 1986: 120, 177.

Source : MNHN, Paris

MATERIAL EXAMINED. — Many ♂♂ and ♀♀ collected from the following localities: Centuri-Port; marine de Pietracorbara; Miomo (N of Bastia); Fautea (between Solenzara and Porto-Vecchio); between Bonifacio and col d'Arbia; Bonifacio; Capo Pertusato (SE of Bonifacio); île de Pinarello.

PREVIOUS RECORDS. — Bonifacio, Bastia (DOLLFUS 1899); "Ghisernia laterni" (ARCANGELI 1914); Corsica (VANDEL 1954a, 1962); île de Pinarello (LANZA & POGGESI 1986).

DISTRIBUTION. — Littoral species distributed along all the coasts of the Mediterranean, the Atlantic coasts of Morocco, Portugal, France, Madeira and the Azores.

Armadillidium sordidum Dollfus, 1887
(Fig. 31)

Armadillidium sordidum; DOLLFUS 1892: 176-177; 1896: 358; 1899: 187; ARCANGELI 1925: 8; VANDEL 1954a: 74; 1962: 816, figs 392-393.

Armadillidium (Armadillidium) sordidum sordidum; ARCANGELI 1954b: 155, pls 15-16.

MATERIAL EXAMINED. — Many ♂♂ and ♀♀ collected from the following localities: Camera (near Centuri); near Meria; between Morsiglia and Pastina; 2 km SE of col de Ste-Lucie (between Pino and Luri); Carbonacce (S of Luri); Selmacci (SW of Pietracorbara); St-Léonard (W of marine de Pietracorbara); between Bastia and St-Florent; Bevinco river valley, below col de S. Stefano; Urtaca; near Murato; lower valley of Asco river; 3 km S of Ponte Leccia, along left bank of Golo river; Folelli, along Fium Alto; Francardo; 1.6 km down from Stazzona (near Piedicroce).

PREVIOUS RECORDS. — Bastia and Porto-Vecchio (?) (DOLLFUS 1892, 1899; ARCANGELI 1925); Orezza (DOLLFUS 1899).

DISTRIBUTION. — This species has a typical Tyrrhenian distribution. It is found in southern France (Maures massif), Corsica, Sardinia, Liguria, Tuscany and Umbria.

REMARKS

In Corsica this species is common on the north-eastern part of the island (in the so-called "Alpine Corsica"), while it seems to be absent in the granitic part. Thus, the record from Porto-Vecchio by DOLLFUS (1892) is doubtful and most probably is due to a misidentification.

Armadillidium assimile Budde-Lund, 1885

Armadillidium Zenckeri; DOLLFUS 1887: 9; ARCANGELI 1914: 461.

Armadillidium esterelanum; DOLLFUS 1892: 139; 1896: 358; SCHARFF 1894: 163.

Armadillidium vizzavonense Verhoeff, 1926: 263; 1928: 121; ARCANGELI 1950: 80; VANDEL 1953a: 164.

Armadillidium vizzavonensis; VANDEL 1954a: 74.

Armadillidium assimile; VANDEL 1962: 803, fig. 386; BERON 1972a: 13.

MATERIAL EXAMINED. — Many ♂♂ and ♀♀ collected from the following localities: Barcaggio (Cap Corse); near Rogliano; Centuri-Port; between Macinaggio and marine de Meria; near Meria; near Carbonacce (S of Luri); marine de Giottani (between Nonza and Centuri-Port); marine de Pietracorbara; near convent of Sta Catterina de Sisco; near Crosciano along Sisco river; Cardo (W of Bastia); anse de Faggiola (désert des Agriates); St-Florent; Casta (SW of St-Florent); Olmeta-di-Tuda; col de S. Stefano (S of Olmeta-di-Tuda); défilé de Lancone, between Casatorra and Oletta; left bank of Golo river, between Barchetta and Casamozza; near grotte de Pietralbello (Moltifao); Asco river valley; plage de Caspio (NW of Porto); 4 km E of Zonza; Fautea (between Solenzara

Source : MNHN, Paris

and Porto-Vecchio); Lovo Santo, swamp at mouth of Cavo river; Taglio Rosso (W of Sta-Lucia-di-Porto-Vecchio); Golfo di Sogno; near Porto-Vecchio; Monte Rosso (SE of Sartène); dolmen de Fontanaccia (S of Sartène); Tizzano and environs (SW of Sartène); near Ermitage de la Trinité (NW of Bonifacio).

PREVIOUS RECORDS. — Bastia (DOLLFUS 1892; SCHARFF 1894; VERHOEFF 1928); Corte, Vico, La Solenzara, l'Ospedale, Porto-Vecchio (DOLLFUS 1892); Vizzavona (DOLLFUS 1892; VERHOEFF 1928; ARCANGELI 1950); between Bastia and S. Martino (VERHOEFF 1926; ARCANGELI 1950); Île-Rousse (VERHOEFF 1928; ARCANGELI 1950); grotte de Carpiniccia (Pietroso) (VANOEL 1953a; BERON 1972a); all Corsica (VANDEL 1962).

DISTRIBUTION. — Beside Corsica, it is known from Sardinia, Tuscany, central-southern France, eastern and southern Spain, Portugal and the Azores.

Armadillidium lanzai n.sp.
(Figs 28, 31)

Armadillidium lanzai (nomen nudum); LANZA & POGGESI 1986: 42, 55, 120, 175, 177, 179, 183.

MATERIAL EXAMINED. — 1 ♂ holotype (MZUF), 38 ♂♂, 52 ♀♀ paratypes (MZUF), 2 ♂♂, 2 ♀♀ paratypes (MNHN-Is4101), îlot Toro Grande, leg. S. Taiti, 17.V.1982; 1 ♀ paratype (MZUF), Faulea (between Solenzara and Porto-Vecchio), leg. B. Conti and B. Lanza, VII-VIII.1977; 2 ♂♂, 2 ♀♀ paratypes (MZUF), same locality, leg. S. Taiti, 17.V.1982; 1 ♂ paratype (MZUF), same locality, leg. S. Taiti and S. Campanelli, 19.X.1982; 3 ♂♂, 1 ♀ paratypes (MZUF), île de la Giraglia, leg. R. Brizzi, R. Innocenti and S. Turillazzi, 30.IX.1972; 3 ♀♀ paratypes (MZUF), same locality, leg. R. Brizzi and R. Pirozzi, 1.VI.1972; many ♂♂ and ♀♀ paratypes (MZUF), same locality, leg. S. Taiti and A. Poggesi, 26.VI.1984; 1 ♂ paratype (MZUF), île de Pinarello, leg. B. Conti and N. Lanza, 10.VIII.1973; 2 ♂♂, 3 ♀♀ paratypes (MZUF), îlot Toro Piccolo, leg. S. Campanelli, 17.V.1982; 13 ♂♂, 23 ♀♀ paratypes (MZUF), îlot Luigi Giafferri (Lavezzi), leg. B. Lanza, 6.VIII.1974.

ETYMOLOGY. — The new species is named after our friend Prof. B. LANZA, Florence, in recognition of his valuable contribution to the knowledge of the Corsican fauna.

DESCRIPTION

Maximum dimensions: ♂, 11.5 × 4.4 mm; ♀, 13 × 5.5 mm.

Colour variable according to the population: usually grey-brown with large pale spots, irregularly arranged; the specimens from îlot Toro Grande and îlot Toro Piccolo have a yellowish ground colour which blends with the pale spots. Dorsum with light granulations. Animals able to roll up into a ball, mesosphaeric type, with anterior corners of pereonite 1 slightly bent up. Eye with 18-20 ommatidia. Cephalon with wide scutellum, slightly protruding and not bent over the vertex, anteriorly convex and posteriorly strongly concave, so that a deep fossette is visible between the scutellum and the anterior margin of the vertex; upper margin of the scutellum slightly concave; antennary lobes quadrangular, protruding frontwards, with antennary grooves shallow. Pereonite 1 with posterior margin regularly sinuous; lateral margin slightly impressed in the posterior third. Telson somewhat broader than long, trapezoidal, with more or less narrow apex and posterior corners rounded.

Male

Pereopod 7 ischium with sternal margin almost straight with some small verrucae, rostral surface with an area of short setae; merus with a small tuft of short setae on the basal part of the rostral surface. Pleopod 1 exopod with a long posterior point, medial margin regularly curved with short spines.

Source : MNHN, Paris

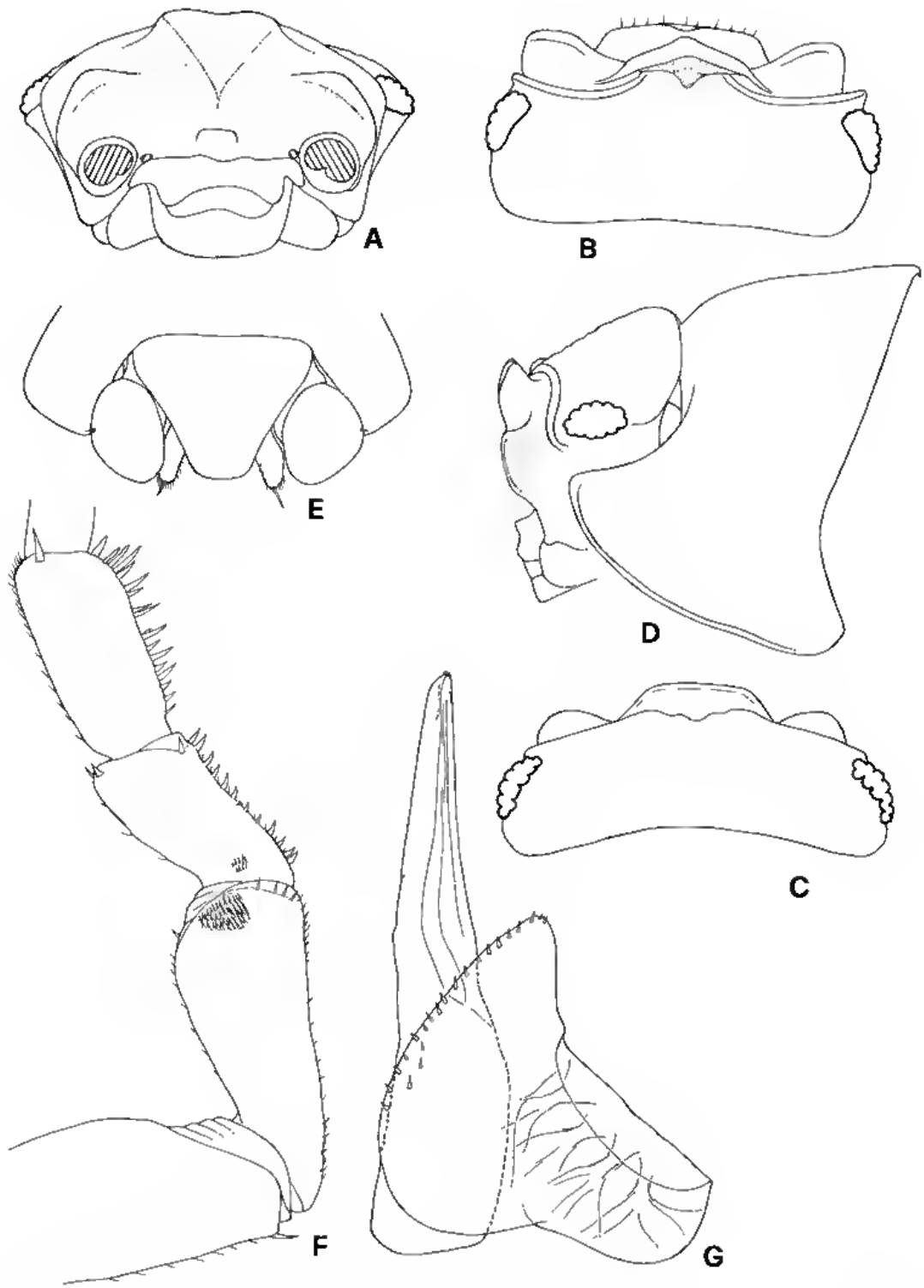


FIG. 28. — *Armadillidium lanzai* n.sp., specimens from ilot Toro Grande: A, cephalon, frontal; B, cephalon, dorsal; C, cephalon, from back; D, cephalon and pereonite 1, lateral; E, telson and uropods; F, ♂ pereopod 7; G, ♂ pleopod 1.

Source : MNHN, Paris

REMARKS

The new species shows morphological affinities with *Armadillidium quinquepustulatum* Budde-Lund, 1885, originally described from Algeria and later recorded from the Maures Massif in southern France, and with *A. maculatum* Risso, 1816, from the Maritime Alps. It is distinguished from the former by the different colour pattern, the more developed scutellum, and the male pereopod 7 ischium more thickset, with no spines on tergal margin and sternal margin less concave with no brushes of setae. It differs from the latter in the colour pattern, the scutellum shorter and not bent over the vertex, telson with wider apex, uropodal exopod shorter and the male pleopod 1 exopod with much more developed posterior point.

The record of this species from an islet near Sardinia (ARGANO & MANICASTRI 1991) is due to a misidentification (MANICASTRI pers. com.).

Armadillidium vulgare (Latreille, 1804)

Armadillidium vulgare; DOLLFUS 1899: 187; VERHOEFF 1926: 263; VANDEL 1954a: 74; BERON 1972a: 13; LANZA & POGGESI 1986: 120, 183.

MATERIAL EXAMINED. — Many ♂♂ and ♀♀ collected from the following localities: Tollare and Barcaggio (Cap Corse); Centuri-Port; near Meria; St-Léonard (W of marine de Pietracorbara); marine de Pietracorbara; Sta Catterina de Sisco; Bastia; anse de Faggiola and désert des Agriates; Casta (SW of St-Florent); défilé de Lancone; col de S. Stefano (S of Olmeta-di-Tuda); Urtaca; near Murato; col de S. Colombano (E of Belgodère); 1 km W of Altiani (SE of Speloncato); Asco river valley, S of Moltifao; Folelli, along Fium Alto; near grotte de Sabara (Castiglione); Francardo; Prunete (E of Cervione); plage de Caspio (NW of Porto); 2 km S of Corte; Ghisoni; col de Verde (S of Ghisoni); Ghisonaccia; 1 km W of Tolla (Prunelli river valley); Porticcio; Monte Incudine; col de Bavella; Taravo river valley; Conca (N of Ste-Lucie-de-Porto-Vecchio); Fautea (between Solenzara and Porto-Vecchio); Lovo Santo, swamp at mouth of Cavo river; valley below chapelle Pianelli, between Casalabriva and Olmeto; mouth of Rizzanèse river, S of Propriano; Monte Rosso, SE of Sartène; la Trinité (N of Porto-Vecchio); Porto-Vecchio; between Bonifacio and col d'Arbia; near ermitage de la Trinité, W of Bonifacio; Bonifacio; Capo Pertusato (SE of Bonifacio); îlot Sperduto Piccolo (E of île Cavallo); île Lavezzi; îlot Cala di u Ghiuncu (île Lavezzi).

PREVIOUS RECORDS. — Between Bastia and Santa Lucia, Santa Reparata, Gravona (Ajaccio) (VERHOEFF 1926); grotte Roumandella (Caporalino) (BERON 1972a); îlot Cala di u Ghiuncu (LANZA & POGGESI 1986).

DISTRIBUTION. — Cosmopolitan species.

Armadillidium album Dollfus, 1887
(Fig. 31)

Armadillidium album; BIGOT, 1977: 7, 12.

MATERIAL EXAMINED. — 8 ♂♂, 2 ♀♀, Calzarello, near Ghisonaccia, beach, leg. S. Taiti and S. Campanelli, 18.X.1982.

Source : MNHN, Paris

PREVIOUS RECORDS. — Eastern coast of Corsica (BIGOT 1977).

DISTRIBUTION. — This halophilic species is widespread along the coasts of the Mediterranean and the Atlantic coasts of Europe.

Armadillidium littorale n.sp.
(Figs 29, 31)

MATERIAL EXAMINED. — 1 ♂ holotype (MZUF), many ♂♂ and ♀♀ paratypes (MZUF), 2 ♂♂, 2 ♀♀ paratypes (MNHN-Is4100), Capo Pertusato (SE of Bonifacio), under stones near beach, leg. S. Taiti and S. Campanelli, 19.X.1982; 5 ♀♀ paratypes (MZUF), same locality, leg. S. Taiti, 18.V.1982; 1 ♀ paratype (MZUF), same locality, leg. S. Taiti, 29.VI.1991.

ETYMOLOGY. — L. *littoralis* = littoral. The name of the species refers to the habitat where the specimens were collected, *i.e.* under stones beyond the upper limit of the beach.

DESCRIPTION

Maximum dimensions: ♂ and ♀ 4 × 1.5 mm.

Brown colour with epimera and muscle spots pale. Dorsum rough, with numerous tiny triangular scale-spines. Animals able to roll up into a perfect ball, eusphaeric type. Eye with 10-12 ommatidia. Cephalon with postscutellar and frontal lines, the former clearly visible only in the medial part; scutellum slightly protruding over the vertex, with upper margin continuing the frontal line, and anterior surface distinctly hollow; antennary lobes oblique, neither thickened nor bent backwards. Pereonite 1 with posterior margin regularly concave; lateral margin slightly swollen and grooved. Telson trapezoidal, much wider than long, with posterior corners broadly rounded. Antenna short and thickset, with second flagellar article about three times as long as the first. Pleopods 1-2 exopod with an indentation on outer margin of the tracheal field. Uropodal exopod much wider than long.

Male

Pereopods with no particular modifications. Pleopod 1 exopod with rounded posterior margin and no posterior point; endopod with stout distal part, apex slightly bent outwards. Pleopod 2 as in Fig. 29H.

REMARKS

Armadillidium littorale is morphologically close to *A. album*, from which it is readily distinguished by the different shape of the scale-spines, the lateral margin of pereonite 1 slightly swollen and grooved, no modifications on the male pereopod 7 and the male pleopod 1 exopod with no posterior point.

Source : MNHN, Paris

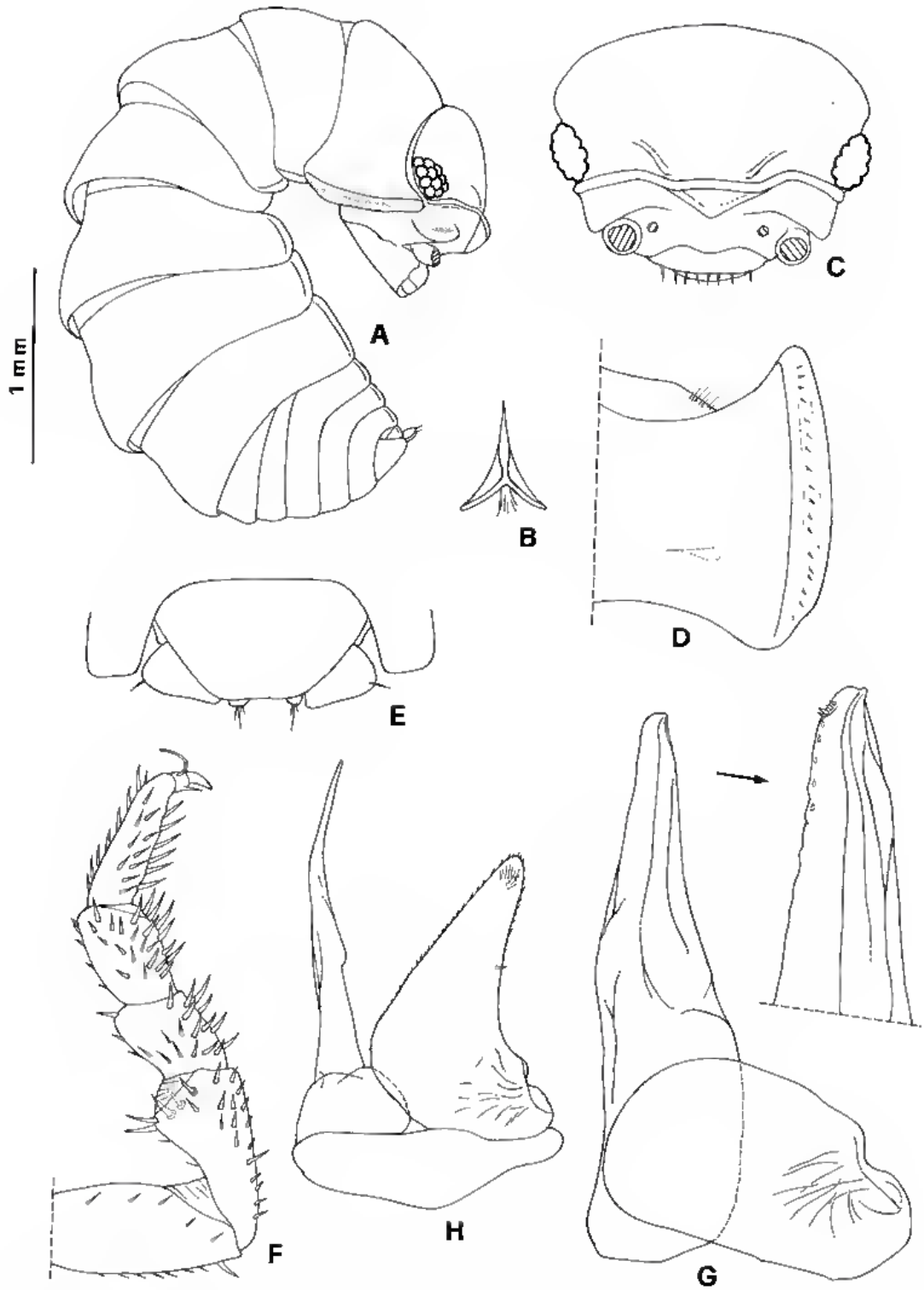


FIG. 29. — *Armadillidium littorale* n.sp.: A, adult ♀, lateral; B, dorsal scale-spine; C, cephalon, dorsal; D, right epimeron of pereonite 1, dorsal; E, telson and uropods; F, ♂ pereopod 7; G, ♂ pleopod 1; H, ♂ pleopod 2.

Source : MNHN, Paris

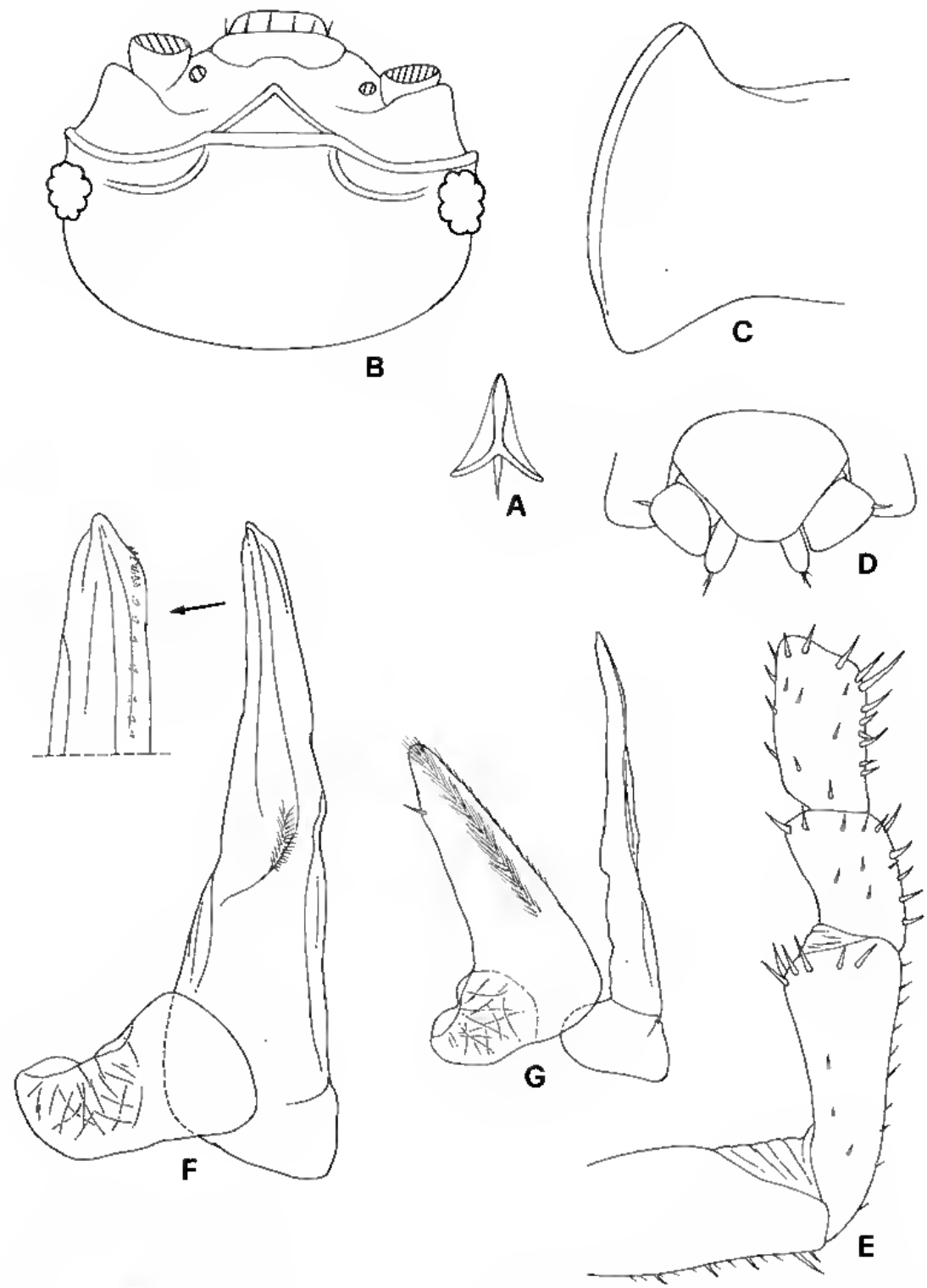


FIG. 30. — *Armadillidium torchiai* n.sp.: A, dorsal scale-spine; B, cephalon, dorsal; C, left epimeron of pereonite 1, dorsal; D, telson and uropods; E, ♂ pereopod 7; F, ♂ pleopod 1, G, ♂ pleopod 2.

Source : MNHN, Paris

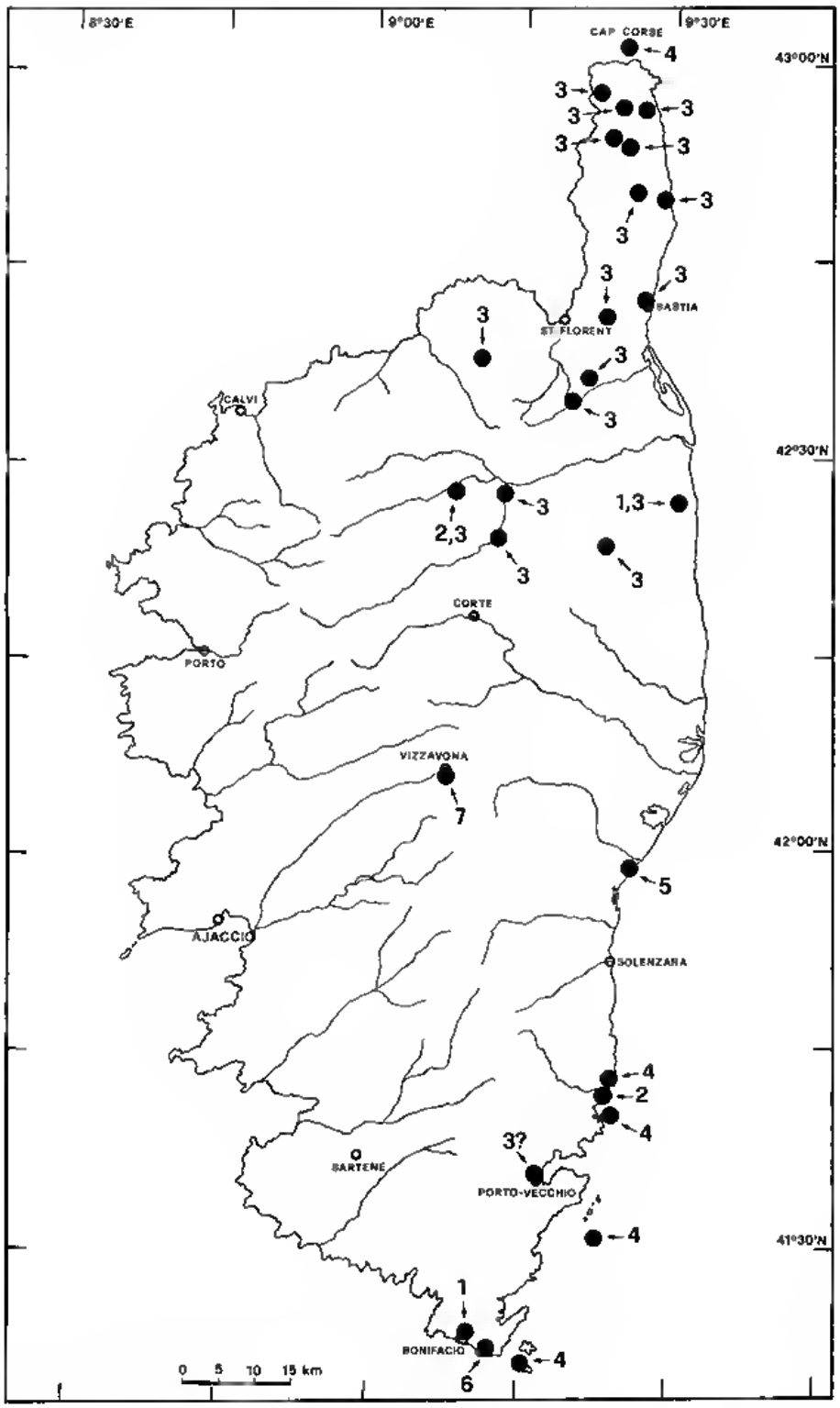


FIG. 31. — Distribution in Corsica of *Armadillidium* species (except *A. granulatum*, *A. assimile* and *A. vulgare*): 1, *A. nasatum nasatum*; 2, *A. nasatum sardoum*; 3, *A. sordidum*; 4, *A. lanzai*; 5, *A. album*; 6, *A. littorale*; 7, *A. torchiai*.

Source : MNHN, Paris

Armadillidium torchiai n.sp.
(Figs 30, 31)

MATERIAL EXAMINED. — 1 ♂ holotype (MZUF), 1 ♂ paratype (MZUF), forêt de Vizzavona, beech wood, 1000-1400 m, leg. A. Torchia and S. Zoia, 27-28.V.1982; 1 ♂ paratype (MV), Vizzavona, leg. M. Meregalli, 25.VIII.1982.

ETYMOLOGY. — The new species is named after one of its collectors, Mr A. TORCHIA, Genoa.

DESCRIPTION

Male

Maximum dimensions: 3.5 × 1.2 mm.

Brown colour with pale muscle spots. Dorsum rough with many small triangular scale-spines. Animals able to roll up into a perfect ball, eusphaeric type. Eye small, consisting of about eight ommatidia. Cephalon with postscutellar and frontal lines, the former visible for almost its entire length; scutellum slightly protruding above vertex, with upper margin continuing the frontal line and anterior surface distinctly concave; antennary lobes oblique, neither thickened nor bent backwards. Pereonite 1 with posterior margin regularly concave, lateral margin very slightly swollen. Telson wider than long, triangular with very broadly rounded apex. Antenna short and stout, with second flagellar article about three times longer than first. Pereopods without particular modifications. Pleopod 1-2 exopods with an indentation on the outer margin of the tracheal field. Pleopod 1 exopod with a short posterior point; endopod with thickset distal part, straight. Pleopod 2 as in Fig. 30G. Uropodal exopod trapezoidal, wider than long.

REMARKS

Armadillidium torchiai is morphologically very close to *A. littorale*, from which it differs in having the lateral margin of pereonite 1 less swollen, the shape of the telson and the male pleopod 1 exopod with a short posterior point.

DISCUSSION

With the data from the present analysis, seventy-six species of terrestrial isopods are known from Corsica, of which eight are described as new and twelve are newly recorded (marked with * in the following list):

Source : MNHN, Paris

1) *Tylos europaeus* Arcangeli, 1938
2) *Tylos ponticus* Grebnitzky, 1874
3) *Helleria brevicornis* Ebner, 1868
4) *Ligia italica* Fabricius, 1798
5) *Finaloniscus briani* Vandel, 1953
*6) *Finaloniscus franciscoloi* (Brian, 1951)
7) *Nesiotoniscus corsicus* Racovitza, 1908
8) *Nesiotoniscus racovitzai* Vandel, 1954
9) *Oritoniscus paganus* Racovitza, 1908
10) *Oritoniscus ocellatus* Vandel, 1953
*11) *Oritoniscus punctatus* n.sp.
12) *Trichoniscus pusillus provisorius* Racovitza, 1908
13) *Trichoniscus pygmaeus* Sars, 1899
14) *Trichoniscus fragilis* Racovitza, 1908
*15) *Trichoniscus halophilus* Vandel, 1951
16) *Trichoniscus pedronensis* Vandel, 1947
17) *Haplophthalmus danicus* Budde-Lund, 1885
18) *Cyrnoniscus remyi* Vandel, 1953
19) *Carloniscus dollfusi* (Carl, 1908)
20) *Buddelundiella cataractae* Verhoeff, 1930
21) *Buchnerillo litoralis* Verhoeff, 1942
22) *Stenoniscus pleonalis* Aubert & Dollfus, 1890
23) *Stenoniscus carinatus* Silvestri, 1897
24) *Armadilloniscus candidus* Budde-Lund, 1885
*25) *Armadilloniscus ellipticus* (Harger, 1878)
26) *Halophiloscia couchii* (Kinahan, 1858)
27) *Halophiloscia hirsuta* Verhoeff, 1928
*28) *Halophiloscia ischiana* Verhoeff, 1933
*29) *Halophiloscia tyrrhena* Verhoeff, 1928
*30) *Stenophiloscia zosterae* Verhoeff, 1928
31) *Chaetophiloscia elongata* (Dollfus, 1884)
32) *Chaetophiloscia sicula* Verhoeff, 1908
33) *Chaetophiloscia cellaria* (Dollfus, 1884)
*34) *Ctenoscia dorsalis* Verhoeff, 1928
35) *Ctenoscia minima* (Dollfus, 1892)
36) *Philoscia affinis* Verhoeff, 1908
37) *Tiroloscia corsica corsica* (Dollfus, 1888)
38) *Tiroloscia macchiae* Verhoeff, 1931
*39) *Tiroloscia montana* n.sp.
40) *Sardoniscus pygmaeus* (Budde-Lund, 1885)
41) *Platyarthrus costulatus* Verhoeff, 1908
*42) *Platyarthrus corsicus* n.sp.
43) *Platyarthrus caudatus* Aubert & Dollfus, 1890
*44) *Platyarthrus aiasensis* Legrand, 1953
45) *Platyarthrus schoeblii schoeblii* Budde-Lund, 1885
*46) *Platyarthrus hoffmannseggii* Brandt, 1833
47) *Cylisticus convexus* (De Geer, 1778)
48) *Cylisticus vandeli* Taiti & Ferrara, 1980
*49) *Cylisticus uncinatus* n.sp.
50) *Troglocylisticus cyrnensis* Ferrara & Taiti, 1983
51) *Protracheoniscus habori* Frankenberger, 1938
52) *Porcellionides pruinosus* (Brandt, 1833)
53) *Porcellionides sexfasciatus sexfasciatus* (Budde-Lund, 1885)
54) *Acaeroplastes melanurus sardous* Verhoeff, 1918
55) *Leptotrichus panzerii* (Audouin, 1826)
56) *Agabiformius lentus* (Budde-Lund, 1885)
57) *Lucasius pallidus* (Budde-Lund, 1885)
58) *Porcellio spatulatus* Costa, 1882
*59) *Porcellio scaber* Latreille, 1804
60) *Porcellio dilatatus dilatatus* Brandt, 1833
61) *Porcellio laevis* Latreille, 1804
62) *Porcellio orarum vizzavonensis* Verhoeff, 1928
63) *Porcellio lamellatus sphinx* Verhoeff, 1931
*64) *Alloschizidium campanellii* n.sp.
65) *Alloschizidium remyi* (Vandel, 1944)
*66) *Alloschizidium cottarelli* (Argano & Pesce, 1974)
67) *Armadillidium nasatum nasatum* Budde-Lund, 1885
*68) *Armadillidium nasatum sardoum* Arcangeli, 1950
69) *Armadillidium granulatum* Brandt, 1833
70) *Armadillidium sordidum* Dollfus, 1887
71) *Armadillidium assimile* Budde-Lund, 1885
*72) *Armadillidium lanzai* n.sp.
73) *Armadillidium vulgare* (Latreille, 1804)
74) *Armadillidium album* Dollfus, 1887
*75) *Armadillidium littorale* n.sp.
*76) *Armadillidium torchiai* n.sp.

According to their present distributions, the species can be grouped in the following categories:

1. Cosmopolitan species (5)

Porcellionides pruinosus, *Agabiformius lentus*, *Porcellio scaber*, *P. laevis* and *Armadillidium vulgare*. All the species are of Mediterranean origin, with the sole exception of *P. scaber*, of West-European origin and most probably introduced to Corsica.

Source : MNHN, Paris

2. European species (8)

Trichoniscus pusillus provisorius, T. pygmaeus, Haplophthalmus danicus, Buddelundiella cataractae, Platyarthrus hoffmannseggii, Cylisticus convexus, Porcellio dilatatus dilatatus and *Armadillidium nasatum nasatum.*

3. Mediterranean-Atlantic species (9)

Tylos europaeus, T. ponticus, Ligia italica, Trichoniscus fragilis, Armadilloniscus ellipticus, Halophiloscia couchii, Stenophiloscia zosterae, Armadillidium granulatum and *A. album.*

4. Holomediterranean species (2)

Chaetophiloscia elongata and *Leptotrichus panzerii.*

5. West-Mediterranean-Atlantic species (12)

Buchnerillo litoralis, Stenoniscus pleonalis, S. carinatus, Armadilloniscus candidus, Ctenoscia dorsalis, C. minima, Platyarthrus costulatus, P. aiasensis, Porcellionides sexfasciatus sexfasciatus, Lucasius pallidus, Porcellio lamellatus sphinx and *Armadillidium assimile.*

6. West-Mediterranean species (8)

Trichoniscus halophilus, Halophiloscia hirsuta, H. ischiana, H. tyrrhena, Chaetophiloscia cellaria, Philoscia affinis, Platyarthrus caudatus and *P. schoeblii schoeblii.*

7. North-Mediterranean species (2)

Chaetophiloscia sicula and *Protracheoniscus babori.*

8. Alpine species (1)

Carloniscus dollfusi.

9. Tyrrhenian species (29)

Helleria brevicornis, Finaloniscus briani, F. franciscoloi, Nesiotoniscus corsicus, N. racovitzai, Oritoniscus paganus, O. ocellatus, O. punctatus, Trichoniscus pedronensis, Cyrnoniscus remyi, Tiroloscia corsica corsica, T. macchiae, T. montana, Sardoniscus pygmaeus, Platyarthrus corsicus, Cylisticus vandeli, C. uncinatus, Troglocylisticus cyrnensis, Acaeroplastes melanurus sardous, Porcellio spatulatus, P. orarum vizzavonensis, Alloschizidium campanellii, A. remyi, A. cottarellii, Armadillidium nasatum sardoum, A. sordidum, A. lanzai, A. littorale and *A. torchiai.*

This last group of species can be further divided according to their distributions:

9a. Corsican endemic species (18)

Finaloniscus briani, Nesiotoniscus corsicus, N. racovitzai, Oritoniscus paganus, O. ocellatus, O. punctatus, Trichoniscus pedronensis, Cyrnoniscus remyi, Tiroloscia montana, Platyarthrus corsicus, Cylisticus vandeli, C. uncinatus, Troglocylisticus cyrnensis, Alloschizidium campanellii, A. remyi, Armadillidium lanzai, A. littorale and *A. torchiai.* Almost one quarter of the species

Source : MNHN, Paris

recorded from Corsica are exclusive to the island. However, the endemism is generally weak, as most of the species are closely related to taxa present in the surrounding area (Mediterranean France, the Pyrénées, the Tuscan Archipelago and Tuscan coastal hills, and Sardinia). Two monospecific genera (*Cyrnoniscus* and *Troglocylisticus*) appear to be exclusive to Corsica. They are very specialised endogean and/or cavernicolous taxa. The former is related to taxa present in the northern Mediterranean area, and the latter to the *nasutus*-group of the genus *Cylisticus* widely distributed in the Tyrrhenian area.

9b. Corsican-Sardinian endemic species (4)

Tiroloscia corsica corsica, *Porcellio orarum vizzavonensis*, *Alloschizidium cottarellii* and *Armadillidium nasatum sardoum*.

9c. North-Tyrrhenian species (5)

Helleria brevicornis, *Tiroloscia macchiae*, *Sardoniscus pygmaeus*, *Acaeroplastes melanurus sardous* and *Armadillidium sordidum*.

9d. Tyrrhenian (*sensu lato*) species (2)

Finaloniscus franciscoloi and *Porcellio spatulatus*.

About 60% of the species have wide distributions (groups 1 to 7), almost all of Mediterranean origin. Seventeen of these species are halophilic (species 1, 2, 4, 14, 15, 21-30, 63 and 74 on the list), and can be considered as real expansive species due to their great facility for dispersal. All are widespread along the coast of the Mediterranean Sea and some also occur on the Atlantic coasts of Africa as far south as the river Senegal.

The number of species with a Tyrrhenian distribution is particularly high (*ca* 38%) and this group is the most interesting from a zoogeographic point of view. In fact, it consists of endemic endogean, cavernicolous or montane taxa, with a low capacity for dispersal, which provide valuable information about the faunistic affinities of Corsica. Indeed a comparison of the oniscidean fauna of Corsica with that of the surrounding regions [Sardinia (ARGANO *et al.* 1995); Tuscan Archipelago and coastal hills (TAITI & FERRARA 1989a and unpublished data), Sicily and circum-Sicilian islands (CARUSO *et al.* 1987), mainland Italy (ARGANO *et al.* 1995), southern France (VANDEL 1960, 1962), Iberian Peninsula (SCHMÖLZER 1971) and North Africa (VANDEL 1955, 1958, 1959)] leads to the following considerations.

In Sardinia the presence of many significant species (Corsican-Sardinian and North-Tyrrhenian elements, vicarious taxa of the genera *Oritoniscus*, *Cylisticus* of the *nasutus*-group, and *Nesiotoniscus*) demonstrates the close faunistic relationship of this island with Corsica. Besides the presence of characteristic taxa, a low number of species of the genera *Porcellio* and *Armadillidium* in both Sardinia and Corsica must be stressed. Only five species of *Porcellio* are known from these islands, mainly widespread or cosmopolitan in distribution, with the exception of *P. orarum vizzavonensis* and *P. spatulatus*. The latter has probably been recently introduced to Corsica if we consider its limited distribution in the southern coastal area of the island. The genus *Armadillidium* is present in the two islands with ten species that are mainly widespread, except *A. sordidum* and the three new species; however the characteristic forms of the Italian

Source : MNHN, Paris

peninsula and Sicily are completely missing. It is important to note that in Italy this genus has very many species, with over sixty forms known at present. Thus, Corsica, like Sardinia, seems to have been excluded from the speciation phenomena and colonizations of these two genera which occurred in Italy. Besides the clear affinities between the two islands, some important differences must also be pointed out. In fact, several characteristic taxa of the Sardinian fauna are missing in Corsica, *i.e.* species of the genera *Scotoniscus* Racovitza, 1908, *Catalauniscus* Vandel, 1953, *Alpioniscus* Racovitza, 1908, *Cordioniscus* Graeve, 1914, *Trichophiloscia* Arcangeli, 1950, *Tritracheoniscus* Taiti & Manicastri, 1985, and the species *Armadillo officinalis* Duméril, 1816; on the contrary, not present in Sardinia are species of the genera *Cyrnoniscus*, *Carloniscus* and *Troglocylisticus*.

The Tuscan Archipelago and coastal hills have numerous species of great zoogeographic value in common with Corsica: the North-Tyrrhenian elements, *Finaloniscus franciscoloi*, *Armadillidium assimile*, and closely related species of the genera *Nesiotoniscus*, *Oritoniscus*, *Tiroloscia*, *Cylisticus* and *Alloschizidium*. Likewise, zoogeographically important species present in Sardinia but not in Corsica are also missing in this area.

As far as Sicily is concerned, there are no significant examples of faunistic affinities with Corsica, except for the species with a wide distribution, *Finaloniscus franciscoloi*, and a species of *Nesiotoniscus* (*N. helenae* Brisolese & Caruso, 1974), which, however, does not belong to the *corsicus*-group.

With regard to a comparison with mainland Italy, all the typical Italian Alpine-Apennine elements are missing in Corsica, *e.g.* species of the genera *Spelaeonethes* Verhoeff, 1932, *Androniscus* Verhoeff, 1908, *Alpioniscus*, *Haplophthalmus* and *Buddelundiella* (with the exception of *H. danicus* and *B. cataractae*, certainly introduced), *Orthometopon* Verhoeff, 1917, *Trachelipus* Budde-Lund, 1908, *Armadillidium* of the *depressum-*, *carniolense-*, *alassiense-*, *furcatum-* and *vulgare*-groups. Moreover, species of *Helleria*, *Oritoniscus*, *Nesiotoniscus* and *Alloschizidium* present in Corsica are absent along the Alpine and Apennine chains.

In southern France (Maures and Estérel massifs, and the Grasse region) there are several zoogeographically important species which are in common with or closely related to forms present in Corsica: *Helleria brevicornis*, *Porcellio orarum*, *Armadillidium sordidum*, species of *Oritoniscus*, *Nesiotoniscus*, *Tiroloscia* and *Cylisticus*.

Oritoniscus paganus, *O. ocellatus* and *O. punctatus* from Corsica show close relationships with species of the same genus from the Pyrénées, while the genus *Tiroloscia* is present in Corsica with *T. corsica corsica*, *T. macchiae* and *T. montana* and in the Pyrénées with *T. pyrenaica* (Dollfus, 1897).

Even though the terrestrial isopods from North Africa are poorly known, it is interesting to point out the presence there of species of the genera *Finaloniscus* (*F. berberensis*) and *Nesiotoniscus* (*N. delamarei* Vandel, 1954 and *N. sebaouensis* Vandel, 1955).

With regard to the distribution of the species within Corsica, ten species populate exclusively the north-eastern part of the island, *i.e.* the so-called "Alpine Corsica" (*Oritoniscus ocellatus*, *Trichoniscus pedronensis*, *Cyrnoniscus remyi*, *Ctenoscia dorsalis*, *C. minima*, *Tiroloscia macchiae*, *Cylisticus convexus*, *Troglocylisticus cyrnensis*, *Alloschizidium remyi* and *Armadillidium sordidum*), while twelve species occur only in the granitic part (*Nesiotoniscus corsicus*, *N. racovitzai*, *Oritoniscus punctatus*, *Tiroloscia montana*, *Platyarthrus corsicus*, *P. aiasensis*, *L. pallidus*,

Source : MNHN, Paris

TABLE 1. — Distribution of terrestrial isopods in circum-Corsican islands.

	Tylos ponticus	*Helleria brevicornis*	*Ligia italica*	*Stenoniscus carinatus*	*Halophiloscia hirsuta*	*Chaetophiloscia sicula*	*Chaetophiloscia cellaria*	*Platyarthrus costulatus*	*Porcellionides pruinosus*	*Acaeroplastes melanurus sardous*	*Porcellio spatulatus*	*Porcellio laevis*	*Porcellio oranum vizzavonensis*	*Porcellio lamellatus sphinx*	*Armadillidium granulatum*	*Armadillidium lanzai*	*Armadillidium vulgare*
Ile de la Giraglia			●		●	●	●	●	●			●	●			●	
Ilot Terre													●	●			
Ilot Intermediaire					●									●			
Ilot Finocchiarola													●				
Ilot Fautea										●			●				
Ilot de la Roscana			●										●				
Ile de Pinarello													●		●	●	
Ile de Cornuta											●						
Rocher de Vacca											●		●				
Ile Pietricaggiosa			●	●	●			●			●		●				
Ilot du Torello								●									
Ilot Toro Grande					●			●			●		●			●	
Ilot Toro Piccolo			●								●		●			●	
Ilot La Folaca			●		●						●		●				
Rocher d'Acciaju Nord	●	●															
Ilot Porraggia Piccola											●						
Ilot Porraggia Grande											●						
Ilot Sperduto Grande			●							●							
Ilot Sperduto Piccolo			●		●												●
Rocher Sud de Ratino										●	●						
Ile Cavallo													●				
Ilot Luigi Giafferri													●			●	
Ilot Gian Pietro Gaffori													●				
Ilot Silene													●				
Ilot Cala di u Ghiuncu					●												●
Ile Lavezzi												●	●				●
Ile Saint Antoine											●						
Ilot Fazzuolo Piccolo											●						
Ilot Sud de la Tonnara										●							
Grand ilot des Bruzzi											●		●				
Ile Piana de Portigliolo													●	●			
Ile Mezzu Mare													●				
Ile de Cala d'Alga													●				
Ilot de Cala Maiora													●				
Ilot Guardiola													●				
Ilot Garganellu													●				
Ilot Palazzu													●				
Ilot Palazzinu													●				
Zeccu d'a Furmicula													●				
Ilot Porri													●				
Rochers d'Elpa Nera													●				
Ilot Nord de Morsella													●				
Ile Spano										●							

Source : MNHN, Paris

P. spatulatus, *P. scaber*, *Alloschizidium campanellii*, *A. cottarellii* and *Armadillidium torchiai*). One species (*Armadillidium littorale*) has been collected only in the Miocenic molasse of Capo Pertusato, near Bonifacio, and three species are exclusive to montane areas above 1000 m altitude (*Trichoniscus pedronensis* in Monte San Petrone, *Tiroloscia montana* in the Haut-Asco area and *Armadillidium torchiai* in the Vizzavona forest).

As concerns the oniscidean fauna of the islands surrounding Corsica (LANZA & POGGESI 1986), seventeen species are presently known from forty-three islets (Table 1). However, we must point out that, except for the île de la Giraglia, the île Pietricaggiosa and the îlots Toro Grande and Toro Piccolo which have been thoroughly investigated, most of the data derive from occasional collectings. Most of the species are littoral or widespread eurytopic ones and occur also in Corsica, with the exception of *Porcellio spatulatus*, which populates only the southernmost islets and the southern coast of the main island, and *Armadillidium lanzai*, recorded from the île de la Giraglia in the North and the île de Pinarello, the îlots Toro Grande, Toro Piccolo, Luigi Giafferri (Lavezzi) and the coast near Fautea in the South.

Twenty-four species are presently known from Corsican caves, most of which must be considered subcavernicolous (RUFFO 1955), *i.e.* trogloxenous, which live near the cave entrances (twelve species: *Helleria brevicornis*, *Ligia italica*, *Stenoniscus pleonalis*, *Halophiloscia hirsuta*, *Ctenoscia minima*, *Philoscia affinis*, *Platyarthrus costulatus*, *Porcellionides pruinosus*, *P. sexfasciatus*, *Porcellio laevis*, *Armadillidium assimile* and *A. vulgare*) or subtroglophilic, which normally live in caves but do not show any peculiar adaptation to cave life (five species: *Trichoniscus fragilis*, *Chaetophiloscia cellaria*, *Cylisticus vandeli*, *Porcellio dilatatus dilatatus* and *Alloschizidium remyi*). The remaining seven species are eucavernicolous (RUFFO 1955), five of them being eutroglophilic (*Finaloniscus briani*, *Nesiotoniscus corsicus*, *Oritoniscus paganus*, *O. ocellatus* and *Oritoniscus* sp.) and two troglobitic (*Cyrnoniscus remyi* and *Troglocylisticus cyrnensis*). It is important to point out that all the eucavernicolous species are endemic to Corsica.

GENERAL CONCLUSIONS

In synthesis, with the present study of the terrestrial isopods from Corsica, the following conclusions can be drawn:

Seventy-six species are known from the island, including eight new species and twelve taxa recorded for the first time. This number of species is certainly conspicuous (for comparison, sixty-six species are recorded from Sardinia, seventy-two from the Tuscan Archipelago and about eighty from Sicily).

About half of the species are West-Mediterranean in distribution, the majority being strictly Tyrrhenian (38%).

Many endemic species are present (about 25% of the total), which demonstrates the importance of Corsica as a speciation area.

The oniscidean fauna of Corsica is closely related to that of the Tuscan Archipelago and, to a lesser extent, to that of Sardinia.

Source : MNHN, Paris

Some important faunistic affinities exist with southern France (massifs of Maures and Estérel, and the Grasse region) and the Pyrénées.

No species of southern origin (Sicilian or North African) has been collected in Corsica, which seems to exclude a zoogeographic relationship with those regions.

KEY TO SPECIES OF TERRESTRIAL ISOPODS FROM CORSICA

1. Able to roll up into a ball 2
— Unable to roll up into a ball 23
2. Epimera of pereonites 2-7 separated from tergites 3
— Epimera of pereonites fused with tergites 5
3. Pleonal tergites fused with each other ..... *Helleria brevicornis*
— Pleonal tergites separated 4
4. Ventral plates of pleonite 5 apically rounded ..... *Tylos europaeus*
— Ventral plates of pleonite 5 apically truncate ..... *Tylos ponticus*
5. Exoantennal rolling up ability 6
— Endoantennal rolling up ability 9
6. Eye absent; maxillular inner branch with 6-8 penicils ..... *Troglocylisticus cyrnensis*
— Eye present; maxillular inner branch with 2 penicils 7
7. Pigmented body; eye with 20-25 ommatidia ..... *Cylisticus convexus*
— Colourless body; eye reduced with maximum 10 ommatidia 8
8. Male pereopod 7 merus with a distinct triangular process ..... *Cylisticus uncinatus*
— Male pereopod 7 merus without any process ..... *Cylisticus vandeli*
9. Antennal flagellum of 3 articles not clearly distinct; uropodal exopod cylindrical ... 10
— Antennal flagellum of 2 distinct articles; uropodal exopod lamellar 11
10. Uropods not completely covered by the telson, clearly visible in dorsal view .... *Buddelundiella cataractae*
— Uropods completely covered by the telson, not visible in dorsal view .. *Buchnerillo litoralis*
11. Pereonite 1 with a notch (schisma) at the posterior corner 12
— Pereonite 1 without a notch at the posterior corner 14
12. Cephalic scutellum with no upper margin, fused with vertex .... *Alloschizidium cottarellii*
— Cephalic scutellum clearly separated from vertex 13
13. Dorsum covered with long piliform scale-spines ..... *Alloschizidium remyi*
— Dorsum with inconspicuous triangular scale-spines ..... *Alloschizidium campanellii*
14. Cephalon with postscutellar line and no frontal line 15
— Cephalon with both postscutellar and frontal lines 21
15. Telson triangular 16
— Telson trapezoidal 19
16. Posterior margin of pereonite 1 with a deep incision at the base of epimeron 17
— Posterior margin of pereonite 1 regularly concave, not incised .... *Armadillidium assimile*
17. Telson with pointed apex; male pereopod 7 ischium with distinct verrucae on sternal margin ..... *Armadillidium granulatum*
— Telson with rounded apex; male pereopod 7 ischium without verrucae on sternal margin. . 18

Source : MNHN, Paris

18. Dorsum smooth; cephalic scutellum protruding above vertex about as much as its width ..... *Armadillidium nasatum nasatum*
— Dorsum granulated; scutellum protruding above vertex about half as much as its width ..... *Armadillidium nasatum sardoum*
19. Male pereopod 7 ischium distinctly enlarged distally ..... *Armadillidium sordidum*
— Male pereopod 7 ischium not enlarged distally 20
20. Cephalic scutellum bent over vertex, not protruding; no fossette between scutellum and vertex ..... *Armadillidium vulgare*
— Cephalic scutellum straight, distinctly protruding above vertex; fossette between scutellum and vertex clearly visible ..... *Armadillidium lanzai*
21. Telson triangular with broadly rounded apex ..... *Armadillidium torchiai*
— Telson trapezoidal 22
22. Male pereopod 7 basis with a distinct conical process in the distal part *Armadillidium album*
— Male pereopod 7 basis without any process ..... *Armadillidium littorale*
23. Antennal flagellum consisting of indistinct articles, so that it appears as a single conicle article 24
— Antennal flagellum consisting of distinct articles 38
24. Pleonite 3 with 1 or 2 tubercles 25
— Pleonite 3 without tubercles 26
25. Pleonite 3 with a distinct median tubercle ..... *Cyrnoniscus remyi*
— Pleonite 3 with 2 median tubercles fused at the base ..... *Carloniscus dollfusi*
26. Pereonites with 6+6 longitudinal ridges ..... *Haplophthalmus danicus*
— Pereonites smooth, granulated or tuberculated, but with no longitudinal ridges 27
27. Male pereopod 7 merus with a distinct hook-like process 28
— Male pereopod 7 merus without any process 29
28. Male pleopod 1 exopod with a protruding lobe on outer margin . *Nesiotouiscus racovitzai*
— Male pleopod 1 exopod without any lobe on outer margin ..... *Nesiotoniscus corsicus*
29. Male pleopod 1 exopod with a long posterior spine 30
— Male pleopod 1 exopod without a posterior spine 32
30. Dorsum smooth 31
— Dorsum granulated ..... *Oritoniscus punctatus*
31. Eye absent; male pleopod 1 endopod longer than exopod ..... *Oritoniscus paganus*
— Eye consisting of a single ommatidium; male pleopod 1 endopod shorter than exopod ..... *Oritoniscus ocellatus*
32. Pereonites with 2 paramedian tubercles ..... *Finaloniscus briani*
— Pereonites with no tubercles 33
33. Male pleopod 2 exopod much longer than wide, as long as endopod *Finaloniscus franciscoloi*
— Male pleopod 2 exopod wider than long, much shorter than endopod 34
34. Eye consisting of 3 ommatidia 35
— Eye reduced, with 1 or 2 ommatidia ..... *Trichoniscus halophilus*
35. Male pleopod 1 endopod apically swollen ..... *Trichoniscus pedronensis*
— Male pleopod 1 endopod apically pointed 36
36. Antennal flagellum of 3 articles; body with few traces of pigment 37

Source : MNHN, Paris

— Antennal flagellum of 4-5 articles; body well pigmented *Trichoniscus pusillus provisorius*
37. Male pleopod 1 exopod with an incision and some setae on outer margin ..... *Trichoniscus pygmaeus*
— Male pleopod 1 exopod without incision and setae on outer margin . *Trichoniscus fragilis*
38. Antennal flagellum of more than 10 articles ..... *Ligia italica*
— Antennal flagellum of 2-4 articles 39
39. Antennal flagellum of 4 articles 40
— Antennal flagellum of 2 or 3 articles 41
40. Uropodal endopod reaching half of exopod ..... *Armadilloniscus candidus*
— Uropodal endopod protruding backwards compared with exopod *Armadilloniscus ellipticus*
41. Antennal flagellum of 3 articles 42
— Antennal flagellum of 2 articles 56
42. Male genital papilla distally bilobed 43
— Male genital papilla entire 47
43. Dorsum granulated 44
— Dorsum smooth 45
44. Male pleopod 1 endopod apically with a conspicuous spine directed outwards ..... *Halophiloscia tyrrhena*
— Male pleopod 1 endopod apically with a conspicuous transverse lobe and a triangular process ..... *Stenophiloscia zosterae*
45. Male pleopod 1 endopod apically with a conspicuous spine 46
— Male pleopod 1 endopod apically without any spine ..... *Halophiloscia ischiana*
46. Male pleopod 1 endopod apically with a spine on outer margin .... *Halophiloscia couchii*
— Male pleopod 1 endopod apically with a spine on inner margin .... *Halophiloscia hirsuta*
47. Cephalon with lateral lobes absent or weakly developed; pleon distinctly narrower than pereon 48
— Cephalon with prominent lateral lobes; body outline continuous ... *Sardoniscus pygmaeus*
48. Eye consisting of a single ommatidium 49
— Eye consisting of several ommatidia 50
49. Male pleopod 1 endopod with distal part bent outwards ..... *Ctenoscia minima*
— Male pleopod 1 endopod with distal part straight ..... *Ctenoscia dorsalis*
50. Frontal line absent 51
— Frontal line present 53
51. Telson rounded ..... *Chaetophiloscia cellaria*
— Telson triangular 52
52. Pereonal epimera with an inner dark and an outer pale stripe ... *Chaetophiloscia elongata*
— Pereonal epimera with an outer dark and an inner pale stripe ..... *Chaetophiloscia sicula*
53. Male pereopod 7 merus with a hook-like process on sternal margin ..... *Philoscia affinis*
— Male pereopod 7 merus with no distinct modifications 54
54. Cephalon with lateral lobes absent 55
— Cephalon with small but distinct lateral lobes ..... *Tiroloscia montana*
55. Male pleopod 1 exopod with outer margin indented and equipped with spines; length 10-13 mm ..... *Tiroloscia corsica corsica*

Source : MNHN, Paris

— Male pleopod 1 exopod with outer margin not indented and without spines; length 5-8 mm ..... *Tiroloscia macchiae*
56. Uropods entirely covered by the telson, not visible in dorsal view 57
— Uropods clearly visible in dorsal view 58
57. Dorsum with very feeble tubercles, distinctly pubescent ..... *Stenoniscus pleonalis*
— Dorsum with distinct tubercles, not pubescent ..... *Stenoniscus carinatus*
58. Body colourless; eye absent 59
— Body pigmented; eye present 64
59. Telson triangular, much shorter than uropodal protopod 60
— Telson with a long distal part, distinctly protruding compared to uropodal protopod . 62
60. Dorsum with longitudinal ridges 61
— Dorsum without ridges ..... *Platyarthrus hoffmannseggii*
61. Cephalon with median lobe rounded ..... *Platyarthrus schoeblii schoeblii*
— Cephalon with median lobe apically indented ..... *Platyarthrus aiasensis*
62. Dorsum with no ridges ..... *Platyarthrus caudatus*
— Dorsum with longitudinal ridges 63
63. Pereonite 7 with 3+3 feeble ridges ..... *Platyarthrus costulatus*
— Pereonite 7 with 2+2 prominent ridges ..... *Platyarthrus corsicus*
64. Pleopods 1-2 exopods with lungs 65
— Pleopods 1-5 exopods with lungs ..... *Protracheoniscus babori*
65. Pereonite 1 with posterior margin straight 66
— Pereonite 1 with posterior margin sinuous 70
66. Body bordered with long setae ..... *Leptotrichus panzerii*
— Body not bordered with long setae 67
67. Suprantennal line present, V-shaped 68
— Suprantennal line absent 69
68. Male pleopod 1 exopod wider than long with rounded distal part. . . *Porcellionides pruinosus*
— Male pleopod 1 exopod longer than wide with triangular distal part ..... *Porcellionides sexfasciatus sexfasciatus*
69. Tip of telson not surpassing uropodal protopod; male pleopod 1 exopod with acute apex ..... *Acaeroplastes melanurus sardous*
— Tip of telson distinctly surpassing uropodal protopod; male pleopod 1 exopod with truncate apex ..... *Agabiformius lentus*
70. Cephalic median lobe spatuliform, projecting well above vertex . *Porcellio lamellatus sphinx*
— Cephalic median lobe triangular or rounded 71
71. Tip of telson rounded or truncate 72
— Tip of telson pointed 73
72. Tip of telson rounded ..... *Porcellio dilatatus dilatatus*
— Tip of telson truncate ..... *Porcellio spatulatus*
73. Male pleopod 1 exopod with truncate or rounded apex 74
— Male pleopod 1 exopod with acute apex 75
74. Male pleopod 1 exopod with truncate apex ..... *Porcellio scaber*
— Male pleopod 1 exopod with rounded apex ..... *Porcellio orarum vizzavonensis*

Source : MNHN, Paris

75. Telson with a triangular distal part, much narrower than basal; eye with more than 20 ommatidia; length up to 20 mm ..... *Porcellio laevis*
— Telson triangular with slightly and regularly concave sides; eye with 10-12 ommatidia; length up to 8 mm ..... *Lucasius pallidus*

Acknowledgements

Our sincerest thanks are due to the following colleagues for the loan of materials: Dr P. BERON, Sofia; Dr H. SCHMALFUSS, Stuttgart; Dr J. C. WEULERSSE, Paris; Dr L. SORBINI, Verona; Prof. F. GIUSTI, Siena. Dr H. DALENS, Toulouse, is particularly acknowledged for the loan of part of the material studied by Prof. A. VANDEL and specimens of *Protracheoniscus occidentalis*. We are very grateful to the Mayor of Moltifao (Corsica) for permission to visit the grotte de Pietralbello.

REFERENCES

ARCANGELI A., 1914. — La collezione di Isopodi terrestri del R. Museo di Zoologia degli Invertebrati di Firenze. *Atti Soc. ital. Sci. nat.* **52**: 455-486.

— 1925. — Gli Isopodi terrestri della Sardegna. *Boll. Musei Zool. Anat. comp. R. Univ. Torino* **39**: 1-75, pls 4-5.

— 1939. — *Sardoniscus pusillus*. Nuovo genere e nuova specie di Isopodo terrestre di Sardegna. *Boll. Musei Zool. Anat. comp. R Univ. Torino* **47**: 125-129, pls 1-2.

— 1947. — La posizione sistematica del genere *Helleria* Ebn. (Crostacei Isopodi terrestri). *Archo zool. ital.* **31**: 373-389.

— 1948. — Schizidiinae sottofamiglia di Armadillidiidae (Crostacei Isopodi Terrestri). *Boll. Ist. Mus. Zool. Univ. Torino* **1** (1943-1948): 213-272.

— 1950. — Gli Isopodi terrestri della Sardegna. 2a Edizione. *Boll. Ist. Mus. Zool. Univ. Torino* **2** (1949-1950): 77-191, pls I-VII.

— 1954a. — *Phalloniscus pygmaeus* (B.L.) è proprio un *Phalloniscus*? (Crostacei Isopodi terrestri). *Boll. Ist. Mus. Zool. Univ. Torino* **4** (1953-1954): 123-126.

— 1954b. — Revisione di alcune specie italiane del genere *Armadillidium* Br. (Crostacei Isopodi terrestri). *Boll. Ist. Mus. Zool. Univ. Torino* **4** (1953-1954): 135-165, pls I-XVI.

ARGANO R., FERRARA F., GUGLIELMO L., RIGGIO S. & RUFFO S., 1995. — Crustacea Malacostraca II (Tanaidacea, Isopoda, Amphipoda, Euphausiacea). *In* A. MINELLI, S. RUFFO & S. LA POSTA (eds). *Checklist delle specie della fauna italiana*, **30**, Calderini, Bologna, 52 p.

ARGANO R. & MANICASTRI C., 1990. — Il genere *Spelaeonethes* Verhoeff, 1932 in Sardegna (Crustacea, Oniscidea, Trichoniscidae). *Fragm. ent.* **22**: 1-10.

— 1991. — A preliminary report on Oniscidean fauna (Crustacea, Isopoda) from central Tyrrhenian islands: 3-8. *In* P. JUCHAULT & J. P. MOCQUARD (eds). *The Biology of terrestrial Isopods*. II. Proceedings of the Third International Symposium on the Biology of Terrestrial Isopods, Poitiers (France), July 10-12, 1990: VI + 221.

ARGANO R. & PESCE G. L., 1974. — Un Elumino mirmecofilo di Sardegna: *Typhloschizidium cottarellii* n.sp. (Isopoda, Oniscoidea, Armadillidiidae). *Fragm. ent.* **9**: 283-291.

AUDOUIN J. V., 1826. — Explication sommaire des planches de Crustacés de l'Égypte et de la Syrie, publiées par Jules-César Savigny, Membre de l'Institut, offrant un exposé des caractères naturels des genres, avec la distinction des espèces. *In* Description de l'Égypte, ou recueil des observations et des recherches qui ont été faites en Égypte pendant l'expédition de l'Armée française, publié par les ordres de sa Majesté l'Empereur Napoléon le Grand. *Histoire Naturelle* **1** (4e partie) : 77-98.

Source : MNHN, Paris

BEAUCOURNU J. C., 1967. — Contribution à la connaissance de la biologie d'*Ixodes (Eschatocephalus) vespertilionis* Koch, 1844 et d'*Ixodes (Pomerantzevella) simplex* Neumann, 1906 (Acarina, Ixodoidea), parasites des Chiroptères. *Ann. Spéléol.* **22** : 543-580.

BERON P., 1972a. — Aperçu sur la faune cavernicole de la Corse. *Série documents, Laboratoire souterrain du C.N.R.S., Moulis* **3** : 1-55.

— 1972b. — Aperçu sur la faune cavernicole de la Corse. *Annls Spéléol.* **27** : 807-810.

BIGOT L., 1977. — Contribution à la connaissance des zoocoenoses ripicoles de surface en Corse. *Ecol. mediter.* **3** : 5-12.

BOLOGNA M. A. & VIGNA TAGLIANTI A., 1985. — *Res Ligusticae* CCXIV. Fauna cavernicola delle Alpi Liguri. *Annali Mus. civ. Stor. nat. Giacomo Doria* **84-bis** (1984): 1-388.

BRIAN A., 1951. — Descrizione di un nuovo genere di Trichoniscidae raccolto in una grotta ligure da Mario Franciscolo. *Boll. Soc. ent. ital.* **81**: 22-25.

— 1953. — Di alcuni Trichoniscidi nuovi della fauna endogea italiana (Isopodi terrestri). *Boll. Soc. ent. ital.* **83**: 26-35.

BUDDE-LUND G., 1885. — *Crustacea Isopoda terrestria per familias et genera et species descripta.* Hauniae, 320 p.

CARUSO D., 1976. — Isopodi terrestri dell'Isola di Pantelleria. *Animalia* **3**: 105-124.

CARUSO D., BAGLIERI C., DI MAIO M. C. & LOMBARDO B. M., 1987. — Isopodi terrestri di Sicilia ed isole circumsiciliane (Crustacea, Isopoda Oniscoidea). *Animalia* Suppl. **14**: 5-211.

CARUSO D. & LOMBARDO B. M., 1982. — Isopodi terrestri delle isole maltesi. *Animalia* **9**: 5-52.

CASSOLA F., 1982. — Il popolamento cavernicolo della Sardegna. *Lav. Soc. ital. biogeogr.*, (N.S.) **7** (1978): 615-755, pls I-III.

COBOLLI SBORDONI M., TAITI S., DE MATTHAEIS E. & KETMAIER V., 1995. — Genetic relationships among populations of the *Oritoniscus paganus* group (Crustacea, Isopoda, Oniscidea) from Corsica and Giannutri (Tuscan Archipelago). *Mém. Biospéal.* **22**: 13-16.

COLLINGE W. E., 1941. — Some remarks on the genus *Helleria* v. Ebner (Terrestrial Isopoda). *Ann. Mag. nat Hist.* **8** (11): 522-526.

DALENS H., 1977. — Comportement constructeur chez l'Isopode *Nesiotoniscus corsicus* Racovitza. *Bull. Soc. Hist. nat. Toulouse* **113** : 181-182.

DOLLFUS A., 1887. — Catalogue provisoire des espèces françaises d'Isopodes terrestres. *Bull. Soc. étud. scient. Paris* **9** : 8-11.

— 1888. — Description d'une espèce nouvelle du genre *Philoscia*. *Bull. Soc. étud. scient. Paris* **11** : 10-11, 1 pl.

— 1892. — Tableaux synoptiques de la faune française. Le genre *Armadillidium* (Crustacés Isopodes terrestres). *Feuille jeun. Nat.* **22** : 15-19, 39-42, 135-141, 175-179.

— 1896. — Sur la distribution géographique des Armadilliens en Europe. *In* P. P. C. HOEK (ed.). *Compte-rendu des Séances du troisième Congrès international de Zoologie*, Leyde, E.J. Brill : 356-358.

— 1897. — Tableau iconographique des *Philoscia* d'Europe. Crustacés Isopodes terrestres. *Feuille jeun. Nat.* **27** : 70-74, 91-95.

— 1899. — Catalogue des Crustacés Isopodes terrestres (Cloportides) de France. *Feuille jeun. Nat.* **29** : 186-190, 207-208.

EBNER V. VON, 1868. — *Helleria*, eine neue Isopoden-Gattung aus der Familie der Oniscoiden. *Verh. zool.-bot. Ges. Wien* **18**: 95-114, pl. **1**.

FERRARA F. & TAITI S., 1878. — Gli Isopodi terrestri dell'Arcipelago toscano. Studio sistematico e biogeografico. *Redia* 61: 1-106.

— 1983. — *Troglocylisticus cyrnensis* n. gen. n.sp. di isopodo terrestre della Corsica (Cylisticidae). *Redia* **66**: 485-590.

— 1984. — *Oritoniscus beroni* nuova specie di isopodo terrestre della Sardegna (Trichoniscidae). *Redia* **67**: 417-420.

— 1985. — Su una nuova specie del genere *Cylisticus* Schnitzler, 1853, della Liguria orientale (Crustacea, Oniscidea). *Fragm. ent.* **18**: 33-37.

Source : MNHN, Paris

FRANKENBERGER Z., 1939. — Über eine neue Art der Gattung *Platyarthrus* Brdt. (Isopoda-Oniscoidea). *Ent. Listy* **2**: 115-117.

GARTHWAITE R. L., LAWSON R. & TAITI S., 1992. — Morphological and genetic relationships among four species of *Armadilloniscus* Uljanin, 1875 (Isopoda: Oniscidea: Scyphacidae). *J. nat. Hist.* **26**: 327-338.

GARTHWAITE R. L. & TAITI S., 1989. — *Platyarthrus aiasensis* Legrand (Isopoda: Oniscidea: Platyarthridae) in the Americas. *Bull. Sth. Calif. Acad. Sci.* **88**: 42-43.

GIORDANI SOIKA A., 1954. — Studi di ecologia e biogeografia – XII. Ecologia, sistematica, biogeografia ed evoluzione del *Tylos Latreillei* Auct. (Isop. Tylidae). *Boll. Mus. civ. Stor. nat. Venezia* **7**: 63-83, pls I-XI.

— 1972. — Nuove ricerche sul genere *Tylos* (Crust. Isop.). *Boll. Mus. civ. Stor. nat. Venezia* **22-23**: 193-210, pls I-VI.

JEANNEL R. & RACOVITZA E. G., 1908. — Biospéologica VI. Enumération des grottes visitées, 1906-1907 (2e Série). *Archs Zool. exp. gén.* **8** (4) : 327-414.

KUSSAKIN O. G., 1982. — Marine and salt water isopod crustaceans (Isopoda) of cold and temperate waters of the Northern Hemisphere. *Opred. Faune SSSR*, **131**: 1-456 [in Russian].

LANZA B., 1979. — Universo in miniatura attorno alla Corsica. *Geos, Milano* **1** (2): 34-51.

LANZA B. & POGGESI M., 1986. — Storia naturale delle isole satelliti della Corsica. *L'Universo, Firenze* **66** (1): 1-198.

MANICASTRI C. & TAITI S., 1994. — Gli Isopodi terrestri dell'Appennino umbro-marchigiano (Crustacea, Oniscidea). *Biogeographia* **17** (1993): 125-150.

PAOLETTI M. G. & STINNER B. R., 1988. — Two new terrestrial Isopoda (Oniscidea) from coralline cays of Venezuela's Caribbean coast. *Proc. ent. Soc. Wash.* **91** (1989): 71-80.

RACOVITZA E. G., 1908. — Biospéologica IX. Isopodes terrestres (Seconde Série). *Archs Zool. exp. gén.* **9** (4) : 239-415, pls IV-XXIII.

REMY P., 1950. — Grottes de Corse. *Annls Spéléol.* **5** : 3-47.

RUFFO S., 1955. — Le attuali conoscenze sulla fauna cavernicola della regione pugliese. *Memorie Biogeogr. adriat.* **3**: 1-143.

SCHARFF R. F., 1894. — Einige Bemerkungen über eine Reise in Corsica. *Ber. senckenb. naturf. Ges.*: 153-167.

SCHMALFUSS H., 1981. — Die Isopoden der Nördlichen Sporaden (Ägäis). *Stuttg. Beitr. Naturk.*, A **343**: 1-24.

— 1983. — Die Landisopoden (Oniscoidea) Griechenlands 4. Beitrag: Gattung *Protracheoniscus*, Teil 1 (Trachelipidae). *Stuttg. Beitr. Naturk.*, A **367**: 1-9.

— 1989. — Die Land-Isopoden (Oniscidea) Griechenlands. 10. Beitrag: Gattung *Trichodillidium* n.g. (Armadillidiidae). *Sber. ost. Akad. Wiss. (Mathem.-naturw. Kl., Abt. I)* **197**: 207-214.

— 1990. — Die Landisopoden (Oniscidea) Griechenlands. 11. Beitrag: Gattung *Chaetophiloscia* (Philosciidae). *Revue suisse Zool.* **97**: 169-193.

— 1991. — The terrestrial isopod genus *Chaetophiloscia* in western Asia (Oniscidea: Philosciidae). *Stuttg. Beitr. Naturk.*, A **463**: 1-9.

— 1992. — The terrestrial isopod genus *Porcellio* in western Asia (Oniscidea: Porcellionidae). *Stuttg. Beitr. Naturk.*, A **475**: 1-45.

SCHMÖLZER K., 1971. — Die Landisopoden der Iberischen Halbinsel. *Monogr. Cien. moder* **80**: I-XI, 1-161, 10 maps.

SCHULTZ G. A., 1972. — Ecology and systematics of terrestrial isopod crustaceans from Bermuda (Oniscoidea). *Crustaceana* Suppl. **3**: 79-99.

— 1995. — Terrestrial isopod crustaceans (Oniscidea) from Paraguay with definition of a new family. *Revue suisse Zool.* **102**: 387-424.

SFENTHOURAKIS S., 1992. — New species of terrestrial isopods (Isopoda, Oniscidea) from Greece. *Crustaceana* **63**: 199-209.

— 1995. — New species of terrestrial isopods (Oniscidea) from central Aegean islands. *Stuttg. Beitr. Naturk.*, A **519**: 1-21.

TABACARU I., 1993. — Sur la classification des Trichoniscidae et la position systématique de *Thaumatoniscellus orghidani* Tabacaru, 1973 (Crustacea, Isopoda, Oniscidea). *Trav. Inst. Spéol. Emile Racovitza* **32** : 43-85.

Source : MNHN, Paris

TAITI S. & FERRARA F., 1980. — Nuovi studi sugli Isopodi terrestri dell'Arcipelago toscano. *Redia* **63**: 249-300.

— 1989a. — Biogeography and ecology of terrestrial isopods from Tuscany. *Monitore zool. ital.* (N.S.) Monogr. **4**: 75-101.

— 1989b. — New species and records of *Armadilloniscus* Uljanin, 1875 (Crustacea Isopoda Oniscidea) from the coasts of the Indian and Pacific oceans. *Trop. Zool.* **2**: 59-88.

— 1991. — New species and records of terrestrial isopods (Crustacea) from the Arabian Peninsula. *Fauna Saudi Arabia* **12**: 209-224.

— 1995a. — Su una nuova specie di *Nesiotoniscus* (Crustacea, Isopoda, Oniscidea) dell'Isola di Capraia (Arcipelago Toscano) con considerazioni sul genere. *Boll. Mus. reg. Sci. nat. Torino* **13**: 313-321.

— 1995b. — Isopodi terrestri (Crustacea, Oniscidea) delle grotte della Toscana (Italia centrale). *Mém. Biospéol.* **22**: 169-196.

TAITI S. & MANICASTRI C., 1980. — *Cylisticus apruttanus*, nuova specie di Isopode terrestre dell'Abruzzo (Crustacea, Oniscoidea). *Fragm. ent.* **15**: 253-257.

VANDEL A., 1944a. — Isopodes terrestres récoltés par M. Remy, au cours de son voyage en Corse (juillet-septembre 1942). I. – Description de *Paraschizidium remyi*, n.sp., suivie de considérations sur l'histoire et la répartition de la famille des Armadillidiidae. *Archs Zool. exp. gén.* (Notes et Revue) **83** : 83-98.

— 1944b. — Isopodes terrestres récoltés par M. Remy au cours de son voyage en Corse (juillet-septembre 1942). II. – La famille des Stenoniscidae B.-L. *Archs Zool. exp. gén.* (Notes et Revue) **84** : 23-47.

— 1945. — Isopodes terrestres récoltés par M. Remy, au cours de son voyage en Corse (juillet-septembre 1942). III. – La famille des Buddelundiellidae. *Archs Zool. exp. gén.* (Notes et Revue) **84** : 100-113.

— 1947. — Espèces françaises, nouvelles ou peu connues, de Trichoniscidae (Isopodes terrestres) (Troisième Partie). *Bull. Soc. zool. Fr.* **72**: 35-53.

— 1951. — Le genre "*Porcellio*" (Crustacés; Isopodes: Oniscoidea). Évolution et systématique. *Mém. Mus. natl Hist. nat.*, N. S., A **3** : 1-192.

— 1953a. — Isopodes terrestres récoltés dans les grottes de la Corse, par le Professeur P.-A. Remy, en 1942 et 1948. *Notes biospéol.* **8** : 153-166.

— 1953b. — Remarques systématiques, morphologiques et biogéographiques sur un groupe de Trichoniscidae Nord-Atlantiques. (Crustacés; Isopodes terrestres). *Bull. Mus natl Hist. nat.*, Paris **25** : 368-375.

— 1954a. — Le peuplement isopodique de la Corse ; étude biogéographique. *Revue fr. Ent.* **21** : 72-84.

— 1954b. — Les Trichoniscides endogés et cavernicoles appartenant au genre *Nesiotoniscus* Racovitza (Crustacés ; Isopodes terrestres). *Notes biospél.* **9** : 149-156.

— 1954c. — Sur une espèce mal connue d'Isopode terrestre, *Phalloniscus pygmaeus* (B.-L.). (*Philoscia pygmaea* B.-L.). (Crustacé). *Bull. Mus natl Hist. nat.*, Paris, **26** : 226-230.

— 1954d. — Note sur deux Armadillidiidae endogés et cavernicoles de la région de Grasse (Crustacés; Isopodes terrestres). *Notes biospél.* **9** : 49-60.

— 1955. — La faune isopodique cavernicole de l'Afrique du Nord (Berbérie). *Notes biospél.* **10** : 63-80.

— 1958. — Les Isopodes terrestres du Rif. *Tamuda* 6 : 127-134.

— 1959. — Les Styloniscidae et les Trichoniscidae de l'Afrique du Nord (Crustacés ; Isopodes terrestres). *Bull. Mus. natl Hist. nat.*, Paris **31** : 159-167.

— 1960. — Isopodes terrestres (Première Partie). *Faune Fr.* 64 : 1-416.

— 1962. — Isopodes terrestres (Deuxième Partie). *Faune Fr.* 66 : 417-931.

— 1968a. — Les Isopodes terrestres et cavernicoles de la Corse. *Annls Spéléol.* **23** : 355-362.

— 1968b. — *I. Isopodes terrestres. In* Mission Zoologique Belge aux îles Galapagos et en Ecuador (N. et J. Leleup, 1964-1965). Résultats Scientifiques. Première Partie. Vol. 1, Bruxelles, L'Imprimerie des Sciences : 37-168.

— 1977. — Les Oniscoïdes (Isopodes terrestres) de la Nouvelle-Zélande et de l'Archipel Kermadec. *Mém. Mus. natl Hist. nat.*, Paris, N.S., A **102** : 1-56.

VERHOEFF K. W., 1910. — Ueber Isopoden, 16. Aufsatz, *Armadillidium* und *Porcellio* an der Riviera. *Jh. Ver. vaterl. Naturk. Württ.*: 115-143.

— 1919. — Ueber augenlose Armadillidien und kritische Prüfung der Familie Armadillidiidae. 25. Isopoden-Aufsatz. *Arch. Naturgesch.*, A **83** (1917): 160-170.

Source : MNHN, Paris

— 1926. — *7. Isopoda. In* Beiträge zur Kenntnis der Land- und Süsswasserfauna Korsikas. I. Ergebnisse der Dr. Paul Schottländer-Lehrexpedition des Jahres 1914. Im Auftrag des Kuratoriums der Dr. P. Schottländer-Stiftung herausgegeben von W. Arndt, Berlin. *Mitt. zool. Mus. Berl.* **12** (2): 263.

— 1928. — Über alpenländische und italienische Isopoden. 37. Isopoden-Aufsatz. *Zool. Jb.* (*Syst.*) **56**: 93-172.

— 1931. — Über Isopoda terrestria aus Italien. 45. Isopoden-Aufsatz. *Zool. Jb.* (*Syst.*) **60**: 489-572, pls 6-8.

— 1933a. — Arthropoden aus südostalpinen Höhlen gesammelt von Karl Strasser, Triest. 7. Aufsatz. *Mitt. Höhl.- u. Karstforsch.*: 1-21.

— 1933b. — Zur Systematik, Geographie und Ökologie der Isopoda terrestria Italiens und über einige Balkan-Isopoden. 49. Isopoden-Aufsatz. *Zool. Jb.* (*Syst.*) **65**: 1-64, pls 1-2.

— 1943. — Cavernicole Diplopoden, Chilopoden und Land-Isopoden der Insel Capri, gesammelt von Dr. G. Buchner, Ischia. *Z. Karst- u. Hohlenk.*: 153-165.

VIGLIANISI F., LOMBARDO B. M. & CARUSO D., 1992. — Differenziamento genetico e morfologico in alcune specie siciliane di Isopodi terrestri del genere *Porcellio* e descrizione di tre nuove specie (Crustacea, Isopoda, Oniscoidea). *Animalia* **19**: 235-273.

WOLF B., 1934. — *Animalium Cavernarum Catalogus*. Pars 2. **3**: 65-144.

Source : MNHN, Paris

Source : MNHN, Paris

Bulletin du Muséum national d'Histoire naturelle, Paris, 4e série, **18**, 1996
Section A, n°s 3-4 : 547-555

Spermatophore morphology and spermatozoal ultrastructure of the recently described hermit crab, *Strigopagurus boreonotus* Forest, 1995 (Decapoda, Anomura, Diogenidae)

by Christopher C. TUDGE

Abstract. — The spermatophore morphology and spermatozoal ultrastructure of the diogenid hermit crab, *Strigopagurus boreonotus*, is described and compared with that of previously investigated diogenid genera. The spermatophores show similarities with those described for the genera *Calcinus* and *Dardanus*. The spermatozoa have an overall morphology which is reminiscent of representatives in the genus *Clibanarius*, above all, the genus *Calcinus*, *while still retaining a particular suite of spermatozoal characters so far unique to Strigopagurus*.

Key-words. — Spermatozoa, spermatophores, ultrastructure, *Strigopagurus*, Diogenidae.

Morphologie du spermatophore et ultrastructure du spermatozoïde du bernard-l'hermite récemment décrit, *Strigopagurus boreonotus* Forest, 1995 (Decapoda, Anomura, Diogenidae)

Résumé. — La morphologie du spermatophore et l'ultrastructure du spermatozoïde du bernard-l'hermite Diogenidae, *Strigopagurus boreonotus*, sont décrites et comparées avec celles des autres genres de Diogenidae précédemment étudiés. Le spermatophore montre des similarités avec ceux décrits dans les genres *Calcinus* et *Dardanus*. Le spermatozoïde a une morphologie générale qui rappelle les espèces du genre *Clibanarius* et surtout du genre *Calcinus*, tout en montrant un ensemble original de caractères spermatologiques trouvés jusqu'ici seulement chez *Strigopagurus*.

Mots-clés. — Spermatozoïde, spermatophores, ultrastructure, *Strigopagurus*, Diogenidae.

C. C. TUDGE, *Department of Invertebrate Zoology, National Museum of Natural History, Smithsonian Institution, Washington D C 20560, USA, current address: Crustacean Laboratory, Museum of Victoria, 71 Victoria Crescent, Abbotsford, Vic. 3067, Australia.*

INTRODUCTION

The anomuran family Diogenidae is a morphologically diverse taxon currently encompassing eighteen genera. Although comprised of a heterogeneous assemblage of genera the family is considered to be an ancient monophyletic group (FOREST 1995). Genera are often characterised by a combination of morphological characters but each character can vary among the other members of the family. Single generic apomorphies are rare. This lack of good generic apomorphies has made elucidating the phylogenetic relationships between the different genera in the Diogenidae very difficult (FOREST 1984, 1995) and has led FOREST to state "*... qu'il est difficile d'éclaircir la phylogénie des Diogenidae et de préciser les liens de parenté entre des genres si disparates.*" (FOREST 1995; 28).

Source : MNHN, Paris

This diversity of adult morphological form in the Diogenidae is reflected in the equally diverse morphology of reproductive components such as spermatophores (MOUCHET 1930, 1931; HAMON 1939; MATTHEWS 1953, 1956, 1957; TUZET & MANIER 1961; UMA & SUBRAMONIAM 1984; TUDGE 1991, 1995a) and spermatozoa (KOLTZOFF 1906; NATH 1942; DHILLON 1964, 1968; JAMIESON 1991; TUDGE 1992; TUDGE & JUSTINE 1994; TUDGE 1995a, b). With the increasing use of transmission electron microscopy to study the ultrastructural characters of spermatophores and spermatozoa within the Diogenidae (and the Anomura in general) some doubt has been cast on the monophyly of the family (TUDGE 1991, 1992, 1995a, b).

The present study describes and illustrates the spermatophore and spermatozoal ultrastructure from the holotype specimen of the diogenid *Strigopagurus boreonotus* and compares it with the ultrastructure of previously studied species in other diogenid genera.

MATERIAL AND METHODS

The specimen of *Strigopagurus boreonotus* Forest, 1995 was collected by Dr B. Richer de Forges during the *Bathus 2* cruise off the west coast of New Caledonia (22°46'S – 167°14'E), south-west Pacific in May 1993. It was collected at station number 718 at a depth of 430-436 m. This specimen is now the designated holotype (MNHN-Pg 5181).

The male reproductive material (testes and the ducts of the vasa deferentia) was removed from the single male specimen and fixed in cold glutaraldehyde for a minimum of two hours at 4 °C then posted to Brisbane (Queensland, Australia) at ambient temperature where the remainder of the fixation and embedding process was carried out.

For light microscopy, glutaraldehyde-fixed spermatophores were viewed under an Olympus BH2 Nomarski interference contrast microscope. Micrographs were taken on an attached Olympus OM-2 camera.

TRANSMISSION ELECTRON MICROSCOPY

The gonad tissue of *Strigopagurus boreonotus* was processed in the Zoology Department, The University of Queensland, by the standard fixation procedure (outlined below) for transmission electron microscopy. This was carried out in a Lynx-el. Microscopy Tissue Processor, after the initial glutaraldehyde fixation and first phosphate buffer wash.

Portions of the testis (approximately 1 mm^3) were fixed in 3% glutaraldehyde in 0.2 M phosphate buffer (pH 7.2), with 1-3% sucrose added, for a minimum of one hour at 4 °C. They were washed in phosphate buffer (3 washes in 15 min), postfixed in phosphate buffered 1% osmium tetroxide for 80 min; similarly washed in buffer and dehydrated through ascending concentrations of ethanol (40-100%). After being infiltrated and embedded in Spurr's epoxy resin, thin sections (50-80 nm thick) were cut on a LKB 2128 UM IV microtome with a diamond knife. Sections were placed on carbon-stabilized colloidin-coated 200 µm mesh copper grids and stained (according to DADDOW 1986) in Reynold's lead citrate for 30 s, rinsed in distilled water, then 6% aqueous uranyl acetate for 1 min, Reynold's lead citrate again for 30 s and a final rinse in distilled water. Micrographs were taken on an Hitachi H-300 transmission electron microscope at 80 kV.

Source : MNHN, Paris

RESULTS

Spermatophore morphology

The pedunculate spermatophores of *Strigopagurus boreonotus* are composed of an ovoid to spherical, sperm-filled ampulla (220 µm long × 170 µm wide) attached to a long, relatively thick stalk (Fig. 1). The spermatophores are large, being approximately 850 µm in length.

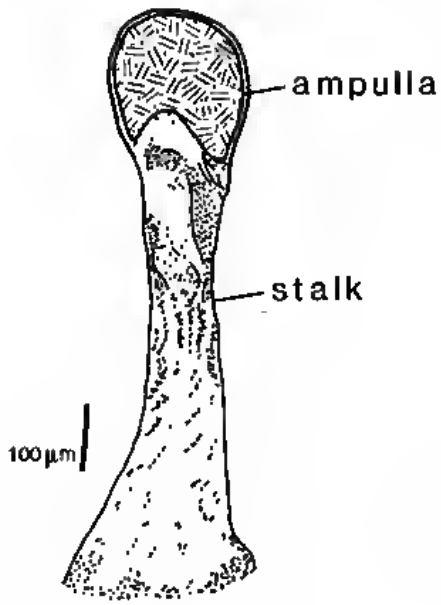


Fig. 1. — *Strigopagurus boreonotus* (Diogenidae). Semidiagrammatic representation of a spermatophore. Traced from a light micrograph. Scale bar as shown.

Spermatozoal morphology

The spermatozoa are composed of a spherical acrosome vesicle capped by a convexly domed operculum and penetrated posteriorly by an extensive perforatorial chamber. The acrosome vesicle has a length of 5.3 µm and is 4.5 µm wide. Posterior to the acrosome vesicle is the cytoplasmic region with three microtubular arms and, more posteriad, the nucleus. The entire sperm cell is approximately 10 µm in length (refer to Figs 2, 3 throughout).

Acrosome

The apical or anterior pole of the acrosome vesicle of *Strigopagurus boreonotus* is covered by a high domed, electron-dense operculum (Fig. 3A, D). Subjacent to, and filling the inside of, the domed operculum is a coarsely granular, homogeneous subopercular zone. The subopercular zone extends posteriorly to meet the perforatorial chamber and laterally to abut on the inner and outer acrosome zones (Fig. 3A). Along this boundary a thin, electron-lucent area containing small electron-dense granules occurs. Thinly enveloping the anterior end of the perforatorial chamber is the inner acrosome zone. This homogeneous, finely granular zone forms an

Source : MNHN, Paris

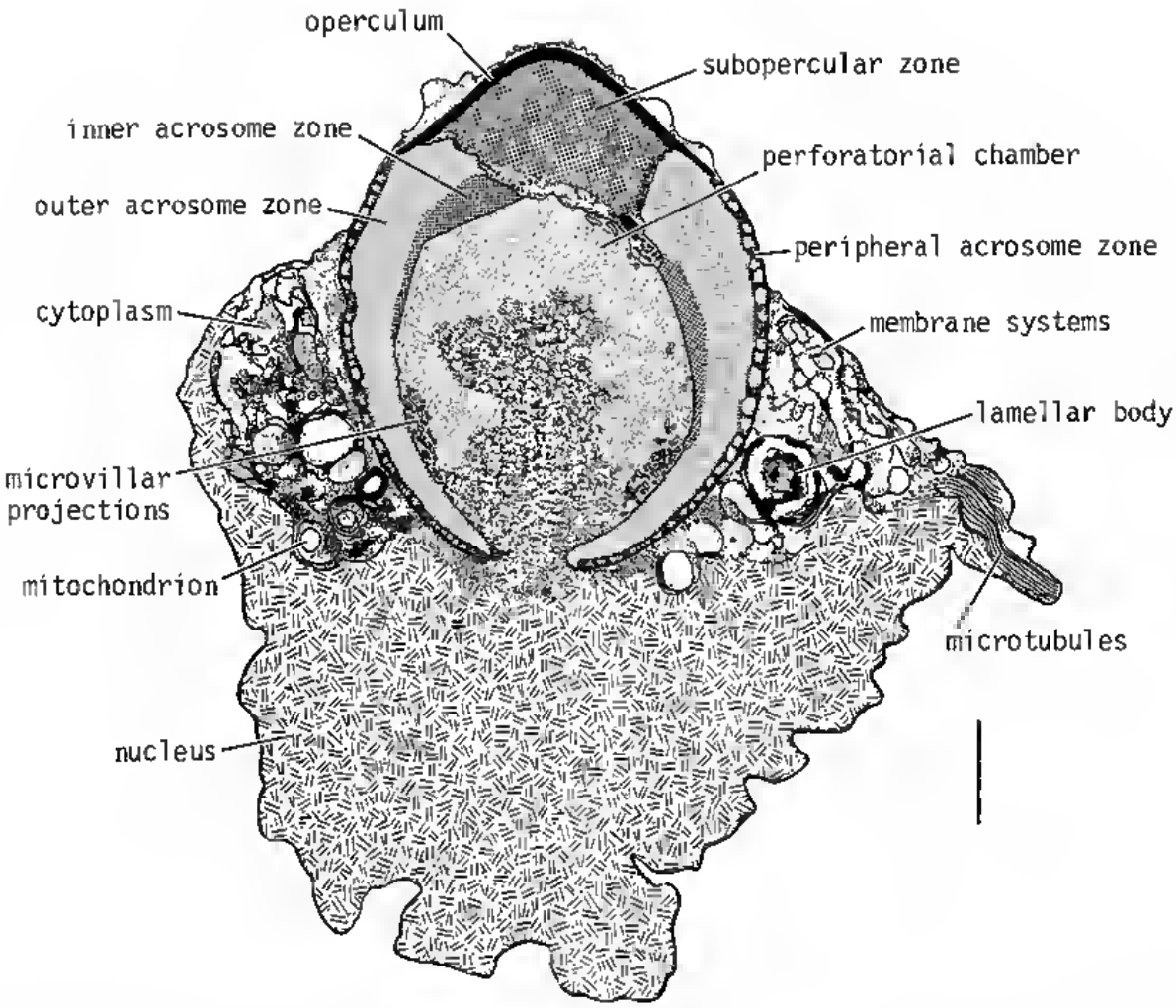


FIG. 2. — *Strigopagurus boreonotus* (Diogenidae). Semidiagrammatic longitudinal section of a spermatozoon, based on a tracing of a micrograph. Scale bar = 1 µm.

electron-dense ring which extends no further posteriad than the widest point of the perforatorial chamber (Fig. 3A, E). External to the inner acrosome zone, and comprising the bulk of the acrosome vesicle, is the outer acrosome zone. This zone is similar in form to the inner acrosome zone but less electron-dense. The outer acrosome zone is prevented from reaching the exterior acrosome membrane by the intervention of a thin, moderately electron-dense zone which lies beneath the acrosome membrane, the peripheral acrosome zone (Fig. 3A, E, F). This peripheral zone has a slightly irregular appearance (pale lacunae in a darker matrix) and extends from the operculum to the basal opening of the perforatorial chamber.

The invaginated perforatorial chamber is spherical, about 3 µm at its widest point and occupies a large portion of the centre of the sperm cell (Fig. 3A, E, F). It has a constricted basal opening and the anteriormost (apical) region can vary in form, giving the appearance of

Source : MNHN, Paris

some asymmetry. Posteriorly, the walls of the perforatorial chamber produce short, microvillar projections which extend laterally into the chamber (Fig. 3A, E). The contents of the perforatorial chamber is divisible into two areas of differing form and the more posterior region appears continuous with the cytoplasm in the region of the constricted opening. The posteriormost portion is coarsely granular, heterogeneous and can appear almost reticulate. This region changes anteriorly to give a more homogeneous, finely granular zone. The boundary between the two areas is approximately at the midpoint of the perforatorial chamber (Fig. 3A).

Cytoplasmic region

The cytoplasm forms a thick collar around the posterior part of the acrosome vesicle, although a thin layer also occurs beneath the vesicle. Abundant membranes and membrane systems associated with numerous cristate mitochondria are a conspicuous part of the cytoplasm (Fig. 3A, C, F). A single, concentrically arranged, membraneous whorl or lamellar scroll is apparent in many of the spermatozoa (Fig. 3A, C). Bundles of microtubules representing the bases of the three microtubular arms pass through the cytoplasm and a pair of centrioles is seen in the cytoplasm directly below the constricted opening of the perforatorial chamber (Fig. 3B). A disrupted nuclear membrane forms a discontinuous partition between the two regions.

Nuclear material

The nucleus is amorphous, but maintains an approximately globular shape with a crenulated external surface, and is surrounded by a thickened nucleo-plasma membrane. The contents of the nucleus are finely granular, relatively homogeneous and electron-pale (Fig. 3A).

DISCUSSION

The spermatophore morphology described for *Strigopagurus boreonotus* is consistent with the pedunculate spermatophore type common in, and perhaps diagnostic of, the Anomura (Tudge 1995a). This pedunculate spermatophore morphology is a tripartite arrangement with a sperm-filled ampulla connected to a pedestal or basal plate via a stalk.

Within the Diogenidae the spermatophore morphology has been recorded from twenty-two species in eight genera (see list of references in the Introduction) and from these representatives the morphology of the spermatophore of *Strigopagurus boreonotus* (Fig. 1) appears most similar to the genera *Calcinus* and *Dardanus*, and especially that described for *Dardanus megistos* (Tudge 1991, 1995a); except that the spermatophore of *S. boreonotus* is nearly six times larger. The importance of size of spermatophores as a reliable distinguishing character in the Anomura is undermined by the fact that spermatophore size is proportional to the diameter of the vas deferens of the reproductive tract which is in turn proportional to the size of the individual specimen. Despite this fact, the size of the spermatophore in *S. boreonotus* (850 µm) more closely approximates the range of sizes recorded for representatives of the genus *Dardanus* (160-3500 µm) than those recorded for the genus *Calcinus* (150-180 µm) (Tudge 1991, 1995a). The

Source : MNHN, Paris

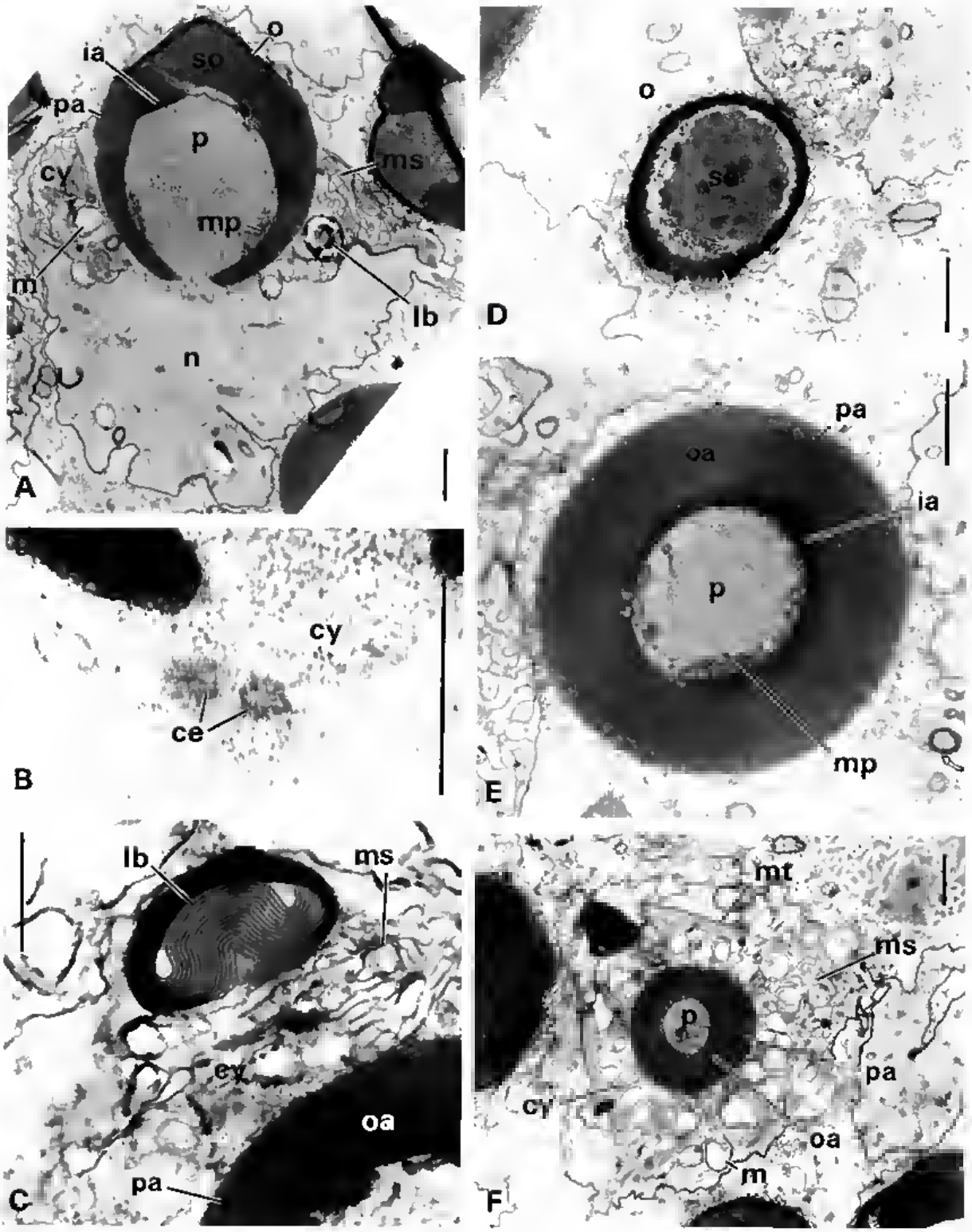


FIG. 3. — *Strigopagurus boreonotus* (Diogenidae). A-F, transmission electron micrographs of spermatozoa. A, Longitudinal Section (LS) of a spermatozoon. B, detail of LS of base of acrosome vesicle and cytoplasm showing two centrioles. C, detail of cytoplasm showing conspicuous lamellar body. D-F, transverse sections through acrosome vesicle at the level of the operculum (D), the microvillar projections (E) and the base of the acrosome vesicle and cytoplasm (F). Abbreviations: ce, centriole; cy, cytoplasm; ia, inner acrosome zone; lb, lamellar body; m, mitochondrion; mp, microvillar projections; ms, membrane system; mt, microtubules; n, nucleus; o, operculum; oa, outer acrosome zone; p, perforatorial chamber; pa, peripheral acrosome zone; so, subopercular zone. Scale bars = 1 µm.

Source : MNHN, Paris

spermatophore morphology of *S. boreonotus* is unlike any morphology recorded for other paguroids (outside the Diogenidae) or even other anomurans (TUDGE 1991, 1995a).

The spermatozoa of *Strigopagurus boreonotus* conform to a general paguroid sperm type characterised by a concentrically zoned acrosome vesicle, apically capped by an electron-dense operculum; the acrosome vesicle shape may vary from spherical, through ovoid, to more elongate and cylindrical; the acrosome vesicle is penetrated from its posterior end by a perforatorial chamber, which may terminate pre-equatorially or extend to a subterminal position immediately beneath the operculum; the acrosome vesicle is embedded in the cytoplasm and/or nucleus and, most importantly, there are three microtubular arms (of cytoplasmic origin) which emerge from the cytoplasm below the acrosome vesicle (POCHON-MASSON 1968a, b; CHEVAILLIER 1970; HINSCH 1980; JAMIESON 1991; TUDGE & JAMIESON, 1991; TUDGE 1992, 1995a, b).

In size and shape the spermatozoa of *Strigopagurus boreonotus* are similar to investigated representatives in the genera *Calcinus* and *Clibanarius*; although many ultrastructural differences are apparent (JAMIESON 1991; TUDGE 1992, 1995a, b). The position of the thin inner acrosome zone on the anterior region of the perforatorial chamber in *S. boreonotus* (Figs 2, 3A, E) is similar in *Calcinus minutus* and the bulbous, almost spherical perforatorial chamber with small microvillar projections (Figs 2, 3A, E, F) is approximated by all three investigated species in the genus *Calcinus* (TUDGE 1995a, b). The tendency for the anterior wall of the perforatorial chamber in *S. boreonotus* to be irregular (Figs 2, 3A) may indicate links to the investigated *Calcinus* species in which this region of the perforatorial chamber divaricates to form two or more distinct fingers or lobes (TUDGE 1995a, b). This latter character's presence is an autapomorphy for the genus *Calcinus*. There is no dense perforatorial ring, an autapomorphy of the investigated *Clibanarius* species, seen in the spermatozoa of *S. boreonotus*. Some (apomorphic?) structures of the acrosome vesicle present in the sperm of *S. boreonotus* which have not been seen in other investigated diogenids are the extreme width and bulbous shape of the perforatorial chamber, the electron-lucent, granular region forming the boundary between the perforatorial chamber and subopercular zone and the loculated appearance of the peripheral acrosome zone (Figs 2, 3A, E, F).

The spermatozoa of *Strigopagurus boreonotus* have a distinct ultrastructural morphology which distinguishes this species from the other investigated genera in the Diogenidae. Some overall similarities to investigated members in the genus *Clibanarius* and also representatives in the genus *Calcinus* are apparent. A preliminary phylogenetic analysis based on spermatozoal and spermatophore characters (analysis in progress, results available upon request) consistently placed *Strigopagurus boreonotus* in the same clade with, and between, the genera *Calcinus* and *Clibanarius* (TUDGE 1995a). At present, only six of the eighteen genera in the Diogenidae have been investigated for spermatophore and spermatozoal morphology. With future research into the remaining genera, spermatophore and spermatozoal ultrastructural morphology may further assist in the elucidation of inter-generic relationships within the family Diogenidae.

Acknowledgements

I wish to thank Dr Bertrand RICHER DE FORGES (ORSTOM, Nouméa) for the collection and initial fixation of the specimen of *Strigopagurus boreonotus*. Mrs Lina DADDOW (Zoology Department, The University of Queensland) is heartily thanked for expert assistance with all aspects of electron microscopy.

Source : MNHN, Paris

I am also grateful to Prof. Jacques FOREST (MNHN, Paris) for identification of the specimen. The use of facilities at the Natural History Museum, Washington D.C., is gratefully acknowledged.

REFERENCES

CHEVAILLIER P., 1970. — *Recherche sur la structure et les constituants chimiques des cellules germinales mâles des Crustacés Décapodes*. Doctor of Science Thesis, University of Rennes, Rennes, France : 1-323.

DADDOW L. Y. M., 1986. — An abbreviated method of the double lead stain technique. *J. Submicrosc. Cytol.* **18**: 221-224.

DHILLON B., 1964. — Sperm nucleus of *Chibanarius longitarsus*. *Experientia* **20**: 505-506.

— 1968. — Radial processes of decapod sperm. *Microscope* **76**: 365-368.

FOREST J., 1984. — Révision du genre *Aniculus* (Decapoda, Diogenidae). *Crustaceana* (Suppl. **8**) : 1-91.

— 1995. — Crustacea Decapoda Anomura: révision du genre *Trizopagurus* Forest, 1952 (Diogenidae), avec l'établissement de deux genres nouveaux. *In* A. CROSNIER (ed.). Résultats des Campagnes MUSORSTOM, Vol. 13. *Mém. Mus. natl Hist. nat* **163** : 9-149.

HAMON M., 1939. — La constitution chimique des spermatophores de Crustacés supérieurs du groupe des Pagurides. *C. R. Soc Biol.* **130** : 1312-1314.

HINSCH G. W., 1980. — Spermiogenesis in *Coenobita clypeatus*. I. Sperm structure. *Int. J. Invert. Reprod.* **2**: 189-198.

JAMIESON B. G. M., 1991. — Ultrastructure and phylogeny of crustacean spermatozoa. *Mem. Qld. Mus.* **31**: 109-142.

KOLTZOFF N. K., 1906. — Studien über die gestalt der zelle. I. Untersuchungen über die spermien der decapoden, als einleitung in das problem der zellengestalt. *Arch. Mikroskop. Anat.* **67**: 364-572.

MATTHEWS D. C., 1953. — The development of the pedunculate spermatophore of a hermit crab, *Dardanus asper* (De Haan). *Pac. Sci.* **7**: 255-266.

— 1956. — The probable method of fertilization in terrestrial hermit crabs based on a comparative study of spermatophores. *Pac. Sci.* **10**: 303-309.

— 1957. — Further evidences of anomuran non-pedunculate spermatophores. *Pac Sci.* **11**: 380-385.

MOUCHET S., 1930. — Mode de formation des spermatophores chez quelques Pagures. *C. R. Acad. Sci. Paris* **190** : 691-692.

— 1931. — Spermatophores des Crustacés Décapodes Anomoures et Brachyoures et castration parasitaire chez quelques Pagures. *Stat. Océanogr. Salammbô, Ann.* **6** : 1-203.

NATH V., 1942. — The decapod sperm. *Trans. Nat. Inst. Sci. India* **2**: 87-119.

POCHON-MASSON J., 1968a. — L'ultrastructure des spermatozoïdes vésiculaires chez les Crustacés Décapodes avant et au cours de leur dévagination expérimentale. I. Brachyoures et Anomoures. *Ann. Sci. Nat., Zool. Biol.* **10** : 1-100.

— 1968b. — L'ultrastructure des spermatozoïdes vésiculaires chez les Crustacés Décapodes avant et au cours de leur dévagination expérimentale. II. Macroures. Discussion et conclusions. *Ann. Sci. Nat., Zool. Biol.* **10** : 367-454.

TUDGE C. C., 1991. — Spermatophore diversity within and among the hermit crab families, Coenobitidae, Diogenidae and Paguridae (Paguroidea, Anomura, Decapoda). *Biol. Bull.* **181**: 238-247.

— 1992. — Comparative ultrastructure of hermit crab spermatozoa (Decapoda: Anomura: Paguroidea). *J. Crust. Biol.* **12**: 397-409.

— 1995a. — *The Ultrastructure and Phylogeny of Anomuran Crab Spermatozoa*. PhD. Thesis, Zoology Department, The University of Queensland, Australia: 1-346.

— 1995b. — Ultrastructure and Phylogeny of the Spermatozoa of the Infraorders Thalassinidea and Anomura (Decapoda, Crustacea). *In* B. G. M. JAMIESON, J. AUSIO & J.-L. JUSTINE (eds). Advances in Spermatozoal Phylogeny and Taxonomy. *Mém. Mus. natl Hist. nat* **166** : 251-263.

Source : MNHN, Paris

TUDGE C. C. & JAMIESON B. G. M., 1991. — Ultrastructure of the mature spermatozoon of the coconut crab *Birgus latro* (L.) (Coenobitidae, Paguroidea, Decapoda). *Mar. Biol.* **108**: 395-402.

TUDGE C. C. & JUSTINE J.-L., 1994. — The cytoskeletal proteins actin and tubulin in the spermatozoa of four decapod crabs (Crustacea, Decapoda). *Acta Zool.* (Stockholm) **75**: 277-285.

TUZET O. & MANIER J.-F., 1961. — Les constituants cytoplasmiques au cours de la spermatogenèse de six pagures. *Bull. Soc. zool. Fr.* **86** : 305-315.

UMA K. & SUBRAMONIAM T., 1984. — A comparative study of the spermatophore in *Scylla serrata* (Forskal) (Decapoda: Brachyura) and *Clibanarius longitarsus* (De Haan) (Decapoda: Anomura). *J. Mar. Biol. Assoc. India* **26**: 103-108.

Source : MNHN, Paris

Source : MNHN, Paris

Bulletin du Muséum national d'Histoire naturelle, Paris, 4e série, **18**, 1996
Section A, nos 3-4 : 557-564

Hypocolpus pararugosus, espèce nouvelle de l'Indo-Ouest Pacifique (Crustacea, Decapoda, Brachyura, Xanthidae)

par Alain CROSNIER

Résumé. — Une espèce nouvelle d'*Hypocolpus*, *H. pararugosus*, est décrite d'après des spécimens récoltés en Nouvelle-Calédonie et au Sri Lanka. Elle avait, jusqu'à maintenant, été confondue avec *H. rugosus* (Henderson, 1893). Sa comparaison avec les formes voisines amène à élever au rang d'espèce la sous-espèce *stenocoelus* Guinot-Dumortier, 1960, de *H. rugosus*.

Mots-clés. — Crustacea, Decapoda, Brachyura, Xanthoidea, Xanthidae, eau profonde, océan Pacifique, Nouvelle-Calédonie, espèce nouvelle.

***Hypocolpus pararugosus*, new species from the Indo-west Pacific (Crustacea, Decapoda, Brachyura, Xanthidae)**

Abstract. — A new species belonging to the genus *Hypocolpus*, *H. pararugosus*, is described after specimens from New Caledonia and Sri Lanka. It had, until now, been confused with *H. rugosus* (Henderson, 1893). The comparison of this species with closely related ones leads to the elevation of the subspecies *rugosus stenocoelus* Guinot-Dumortier, 1960, to full species rank.

Key-words. — Crustacea, Decapoda, Brachyura, Xanthoidea, Xanthidae, deep water, Pacific Ocean, New Caledonia, new species.

A. CROSNIER, *Océanographe biologiste ORSTOM, Muséum national d'Histoire naturelle, Laboratoire de Biologie des Invertébrés Marins et Malacologie, 55 rue de Buffon, F-75231 Paris cedex 05.*

Lors de la campagne BATHUS 1, effectuée avec le navire de l'ORSTOM *Alis* au large de la Nouvelle-Calédonie, un spécimen d'*Hypocolpus* a été capturé par 140-150 m de profondeur. Il s'est révélé appartenir à une espèce nouvelle, dont un exemplaire avait déjà été capturé au Sri Lanka au début de ce siècle, mais avait alors été identifié, à tort, par LAURIE (1906), puis par GUINOT-DUMORTIER (1960), à *Hypocolpus rugosus* (Henderson, 1893).

Cette espèce est décrite ci-après et comparée aux espèces qui lui sont les plus proches.

Hypocolpus pararugosus n.sp.
(Figs 1, 2A-C, 3A-B)

Hypocolpus rugosus rugosus Guinot-Dumortier, 1960, en partie : 197 (seulement la femelle identifiée par LAURIE et mentionnée ci-après dans le matériel examiné). Non Henderson, 1893.

MATÉRIEL EXAMINÉ. — Nouvelle-Calédonie, BATHUS I : stn DW 692, 20°35,43'S – 164°58,88'E, 140-150 m, 17.III.1993 : 1 ♂ 15,7 × 23,8 mm (MNHN-B 22937).

Source : MNHN, Paris

Sri Lanka, Golfe de Manaar, Hermann coll., Laurie det., 1906 : 1 ♀ ovigère 12,4 × 18,0 mm (BM 1907.5.22.215).

TYPES. — Le mâle récolté à la station DW 692 de BATHUS 1 est l'holotype. La femelle provenant du Sri Lanka est un paratype.

ÉTYMOLOGIE. — L'adjonction du mot grec *para*, près, à *rugosus* rappelle combien cette espèce nouvelle est proche de celle décrite par HENDERSON, en 1893, sous ce dernier nom.

DESCRIPTION (faite d'après l'holotype).

La carapace, pratiquement glabre, est 1,5 fois plus large que longue et présente des lobules proéminents, ornés de granules assez gros, pas très serrés et séparés par des espaces lisses ou garnis de minuscules ponctuations. Les sillons séparant les lobules sont lisses. La disposition de ces lobules correspond à celle proposée par DANA en 1852 (Fig. 3A); on notera toutefois que le lobule 2M est divisé en deux par un sillon longitudinal et que l'aire cardiaque (1P) est divisée en trois : deux gros lobules antérieurs, disposés côte à côte et un petit lobule postérieur impair.

Le front présente deux lobes peu proéminents, reliés aux orbites par une faible concavité.

Le bord antérolatéral de la carapace est fortement saillant, lisse à l'œil nu (avec de minuscules granules à un assez fort grossissement), et légèrement convexe; il s'étend, en arrière, jusqu'au niveau de la pointe externe du lobule 3L. Le reste du bord latéral de la carapace porte ensuite des granules dont deux sont plus gros que les autres, puis est excavé pour permettre aux pattes ambulatoires 4 et 5 de venir s'appliquer étroitement contre la carapace lorsqu'elles se replient. Les deux gros granules se trouvent, l'un légèrement en arrière de l'extrémité postérieure du bord antérolatéral lisse, l'autre un peu en avant de la partie excavée.

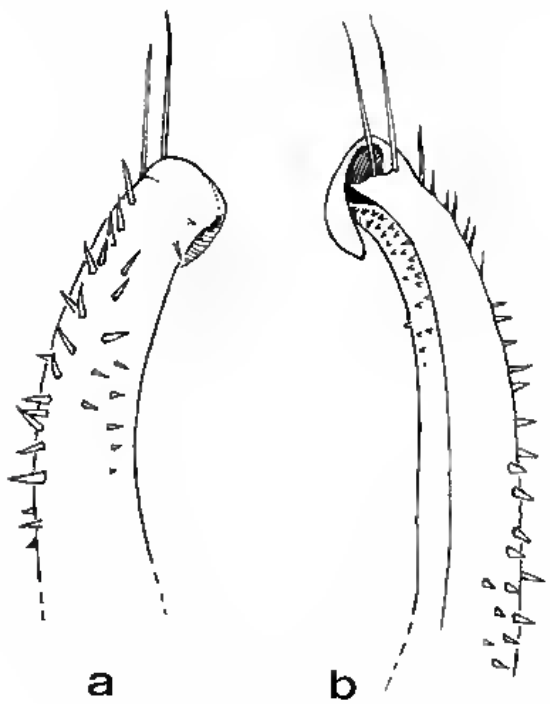


FIG. 1. — *Hypocolpus pararugosus* n.sp., Nouvelle-Calédonie : ♂ holotype, 15,7 × 23,8 mm (MNHN-B 22937). a, partie distale du pléopode 1 droit, vue dorsale; b, *idem*, vue ventrale.

Source : MNHN, Paris

Le bord postérieur de la carapace, légèrement sinueux, est bordé par deux rangées de granules; ceux de la rangée postérieure sont nettement plus petits que ceux de la rangée antérieure.

La cavité sous-hépatique, qui demeure bien visible lorsque le chélipède correspondant est replié, est de grande taille et s'étend transversalement. Elle est quatre fois plus longue que large. Ses bords antérieur et postérieur, à peine arqués, sont subparallèles sur presque toute leur longueur et la cavité ne présente pas de rétrécissement marqué dans sa partie externe; son bord interne, régulièrement arrondi, dépasse l'aplomb du bord externe de l'orbite; sa partie externe forme une surface plate, non bordée. L'intérieur de la cavité, lisse, est plus creusée dans sa partie postérieure que dans sa partie antérieure et présente, sur presque toute sa longueur, un très léger renflement. Le bord postérieur de la cavité est longé extérieurement, sur ses deux tiers internes environ, par une dépression bien marquée, bordée postérieurement par des granules.

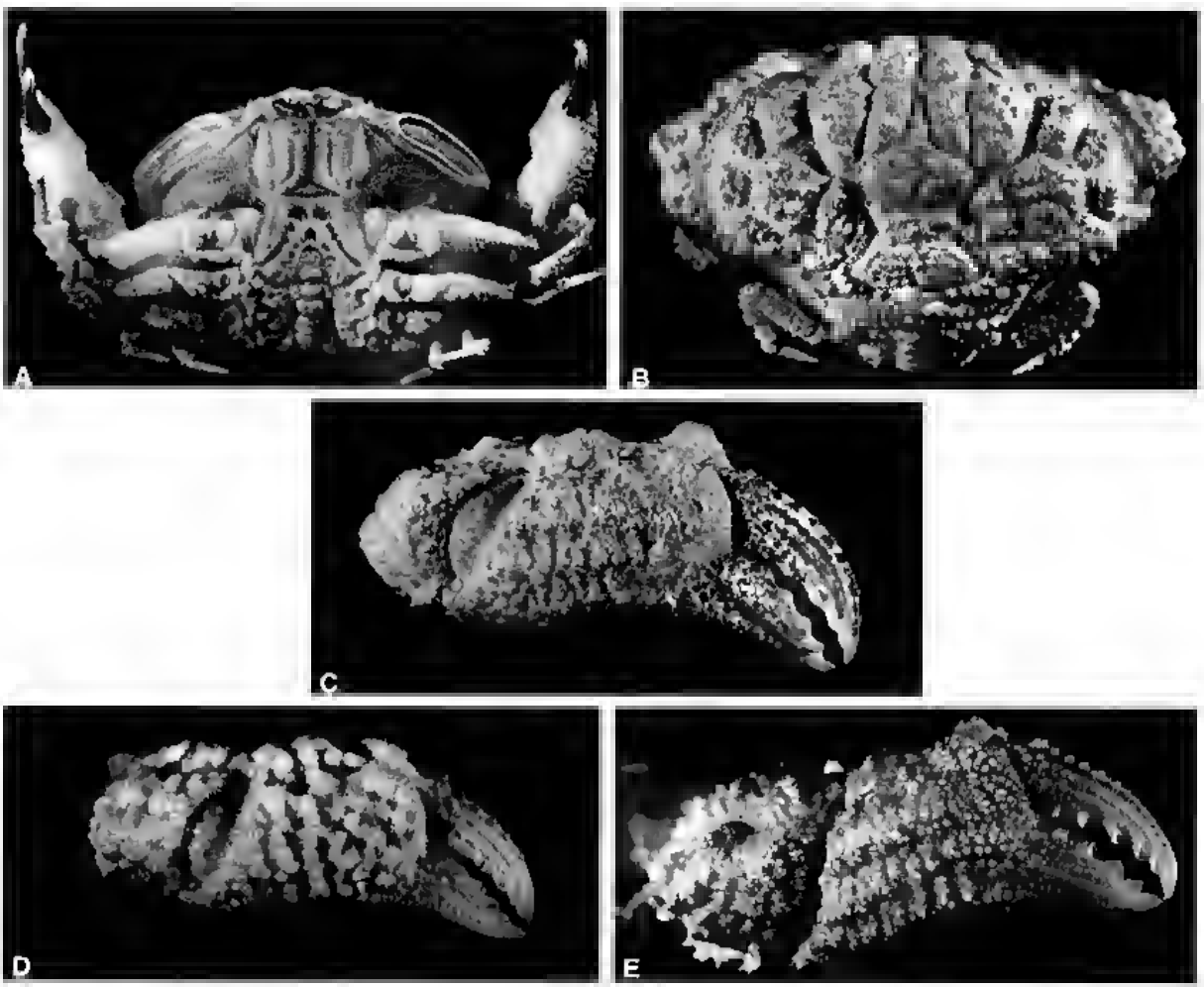


FIG. 2. — A-C, *Hypocolpus pararugosus* n.sp. A, ♂ holotype, 15,7 × 23,8 mm, Nouvelle-Calédonie (MNHN-B 22937) : vue ventrale de l'animal entier; B, carpe et propode du chélipède droit, vue externe. C, ♀ ovigère paratype, 12,4 × 18,0 mm, Sri Lanka (BM 1907.5.22.215) : vue dorsale de l'animal entier. D, *Hypocolpus rugosus* (Henderson, 1893), ♀ lectotype, 12,6 × 18,5 mm, Inde : carpe et propode du chélipède droit, vue externe. E, *Hypocolpus stenocoelus* Guinot, 1960, ♂ lectotype, 15,0 × 22,9 mm, île Maurice (BM 1889.3.27.22) : carpe et propode du chélipède droit, vue externe.

Source : MNHN, Paris

Les parties visibles des sternites sont creusées de dépressions peu granuleuses, séparant des protubérances fortement granuleuses. L'ensemble présente ainsi un aspect fortement érodé.

Les troisièmes maxillipèdes sont granuleux, avec un mérus présentant deux dépressions lisses et un ischion avec un sillon longitudinal médian également lisse.

Les parties visibles des chélipèdes et des pattes ambulatoires repliés (à l'exception des dactyles) présentent de gros nodules et des granules plus ou moins gros. On notera, en particulier, une forte protubérance arrondie sur la partie antérieure de la face externe du carpe des chélipèdes.

L'abdomen, dont les segments 3-5 sont soudés, présente sur les segments 2-5 un fort renflement transversal, qui, à peine divisé transversalement par un sillon sur les segments 2 et 3, présente une division bien marquée sur les segments 4 et 5. Sur le segment 6, on observe deux renflements largement séparés.

Les pléopodes 1 et 2 présentent l'aspect habituel observé chez les espèces du genre. On notera seulement que les grandes soies distales des pléopodes 1 sont au nombre de deux (Fig. 1a-b).

Le paratype (Fig. 2C) est bien conforme au type. On notera seulement que le rapport longueur/largeur de la cavité sous-hépatique est de 3,8 et que la partie antérieure de l'aire cardiaque (1P) n'est pas divisée en deux.

REMARQUES

GUINOT-DUMORTIER (1960 : 197) a bien analysé la plupart des différences séparant la femelle du Sri Lanka, identifiée à *H. rugosus* par LAURIE, des types d'HENDERSON, mais elle n'a pas conclu à son appartenance à une espèce différente.

Onze espèces d'*Hypocolpus* ont été décrites jusqu'à présent : *H. abbotti* Rathbun, 1894 ; *H. diverticulatus* (Strahl, 1861) ; *H. guinotae* Vannini, 1982 ; *H. haanii* Rathbun, 1909 [= *H. granulatus* de Haan, 1837, cf. YAMAGUCHI & BABA 1993 : 443] ; *H. kurodai* Takeda, 1980 ; *H. mararae* Crosnier, 1991 ; *H. pardii* Galil & Vannini, 1960 ; *H. perfectus* Guinot-Dumortier, 1960 ; *H. punctatus* (Miers, 1884) ; *H. rugosus rugosus* (Henderson, 1893) ; *H. rugosus stenocoelus* Guinot-Dumortier, 1960.

H. pararugosus, par la forme de sa cavité sous-hépatique, est proche de *H. haanii* Rathbun, 1909, *H. rugosus rugosus* (Henderson, 1893) et *H. rugosus stenocoelus* Guinot-Dumortier, 1960.

Nous avons pu examiner le matériel suivant de ces dernières espèces :

H. haanii : Japon, spécimen acheté au revendeur Frank par le Muséum de Paris et provenant de la collection faite par Von Siebold et Bürger (T. YAMAGUCHI in litt.). 1 ♂, 26,6 × 37,9 mm (MNHN-B 8588).

H. rugosus : Inde (côte sud-est), golfe de Manaar (Tuticorin), Thurston coll., syntypes : 2 ♀♀, 9,1 × 13,3 mm et 12,6 × 18,5 mm (BM 1939.9.20.1-2). Nous sélectionnons la femelle de 12,6 × 18,5 mm comme lectotype.

Indonésie, Iles Kai, expédition danoise de 1922, stn 61, 50 m, 14.V.1922 : 1 ♀, 8,9 × 14,1 mm (MNHN-B 22294). Ce spécimen, qui n'était pas encore identifié, est ici mentionné pour la première fois. Il est malheureusement en très mauvais état.

H. rugosus stenocoelus : Ile Maurice, syntypes : 2 ♂♂ 14,1 × 21,2 et 15,0 × 22,9 mm (BM 1889.3.27.22). C'est par erreur que GUINOT-DUMORTIER (1960 : 198) mentionne, pour les syn-

Source : MNHN, Paris

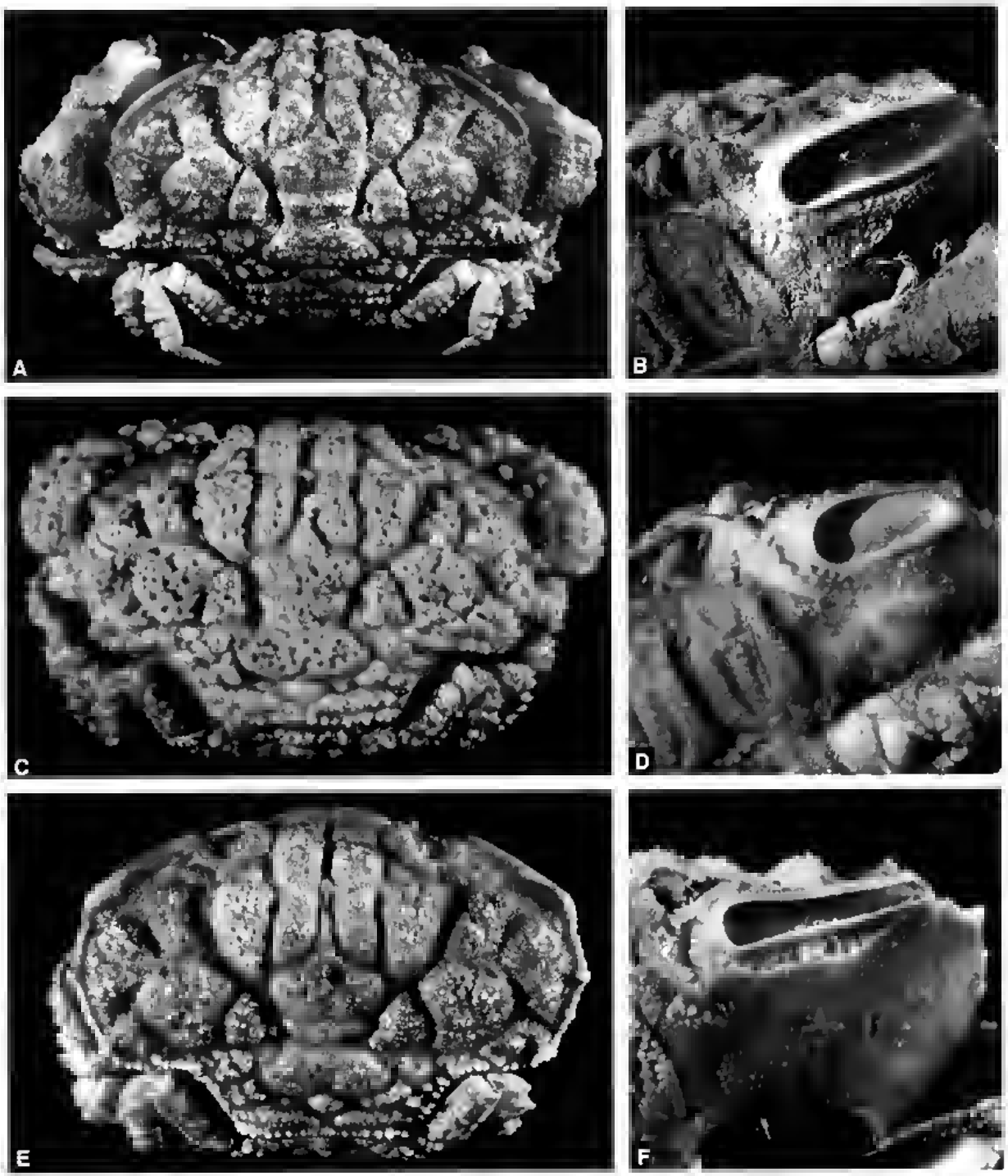


FIG. 3. — Vue dorsale de l'animal entier et cavité sous-hépatique gauche A-B, *Hypocolpus pararugosus* n.sp., Nouvelle-Calédonie : ♂ holotype, 15,7 × 23,8 mm (MNHN-B 22937). C-D, *Hypocolpus rugosus* (Henderson, 1893), Inde, golfe de Manaar : ♀ lectotype, 12,6 × 18,5 mm (BM 1939.9.20.1-2). E-F, *Hypocolpus stenocoelus* Gninot, 1960, île Maurice : ♂ lectotype, 15,0 × 22,9 mm (BM 1889.3.27.22).

Source : MNHN, Paris

types, une femelle et un mâle. Par ailleurs, cet auteur n'ayant pas désigné d'holotype pour cette sous-espèce, nous sélectionnons le mâle de 15,0 × 22,9 mm comme lectotype.

H. haanii se sépare d'*H. pararugosus* par, entre autres :

— le bord postérieur de la cavité sous-hépatique qui est fortement convexe, de sorte que la largeur de la cavité sous-hépatique est très variable, son maximum se situant vers le milieu de sa longueur (*cf.* GUINOT-DUMORTIER 1960, pl. II, fig. 12). Le rapport longueur/largeur de la cavité est voisin de 2,75. Par ailleurs, aucune dépression ne borde, extérieurement, le bord postérieur de la cavité et aucun renflement longitudinal ne s'observe chez celle-ci;

— les granules couvrant le corps qui sont beaucoup plus nombreux (plus serrés) et nettement mieux marqués. Cette différence est très nette, tant sur la face dorsale de la carapace que sur la face ventrale du corps (sternites et abdomen en particulier);

— le pléopode I qui porte cinq longues soies distales (au lieu de deux).

H. rugosus rugosus (Fig. 3C-D) se distingue par :

— la cavité sous-hépatique proportionnellement plus courte et dont la largeur décroît régulièrement de sa partie interne à sa partie externe (Fig. 3D et GUINOT-DUMORTIER 1960, pl. II, fig. 13). Le rapport longueur/largeur de la cavité est compris entre 2,5 et 2,7. Par ailleurs la dépression qui borde extérieurement le bord postérieur de la cavité est beaucoup moins marquée;

— la partie saillante du bord antérolatéral de la carapace plus courte (en liaison avec le moindre développement en longueur de la cavité sous-hépatique) et se terminant par une dent granuleuse bien marquée (dent qui est totalement absente chez *H. pararugosus*);

— les granules couvrant le corps beaucoup mieux marqués, le relief apparaissant ainsi nettement plus accentué; le bord antérolatéral saillant de la carapace, notamment, est granuleux (au lieu de paraître lisse à l'œil nu). Les dents latérales de la carapace sont nettement plus fortes. Sur la face dorsale de la carapace, entre les amas de granules, on note des petites dépressions nettes et profondes qui manquent chez *H. pararugosus*.

H. rugosus stenocoelus (Fig. 3E-F) se différencie par :

— la cavité sous-hépatique proportionnellement plus courte mais surtout beaucoup plus étroite et dont la largeur décroît régulièrement de sa partie interne à sa partie externe (Fig. 3F et GUINOT-DUMORTIER 1960, pl. II, fig. 15). Le rapport longueur/largeur de la cavité est très voisin de 5. Chez cette espèce, on observe, comme chez *H. pararugosus*, une dépression bordant extérieurement le bord postérieur de la cavité, dépression encore mieux marquée que chez *H. pararugosus*;

— la partie saillante du bord antérolatéral de la carapace plus courte (en liaison avec le moindre développement en longueur de la cavité sous-hépatique);

— les granules semblables à ceux de *H. rugosus rugosus*; cependant, l'ensemble de la face dorsale de la carapace semble avoir un relief un peu moins accentué, ceci semblant essentiellement dû à un meilleur développement de la pilosité de la carapace qui amortit les reliefs. On notera également que, chez les spécimens de *H. rugosus stenocoelus* que nous avons examinés, les soies sont brunes (au lieu d'être blanchâtres chez *H. rugosus rugosus*); de ce fait les granules, entourés par ces soies, sont plus visibles.

Source : MNHN, Paris

Si les comparaisons ci-dessus montrent que *H. pararugosus* se distingue somme toute facilement des espèces qui lui sont le plus proches, elles montrent également, à notre avis, qu'il n'est pas justifié de considérer *H. stenocoelus* comme étant une sous-espèce de *H. rugosus*, la forme particulière de la cavité sous-hépatique suffisant, à elle seule, à justifier l'élévation au rang d'espèce de ce taxon. D'autres différences existent également entre *H. rugosus* et *H. stenocoelus* et ont bien été mises en relief par GUINOT-DUMORTIER (1960 : 201-202) que l'on aura intérêt à relire. En particulier, comme cet auteur le fait remarquer, le bord latéral de la carapace, en arrière de la partie saillante correspondant à la cavité sous-hépatique, « forme une crête déprimée et surmontée de granules petits, assez réguliers, nombreux [chez *H. stenocelus*] tandis que chez *H. rugosus* le bord est formé par une succession de dents granuleuses peu nombreuses dont l'irrégularité masque la dépresston marginale ». Ces caractères s'observent bien sur les photos C et E de la Fig. 3. Par ailleurs la granulation des chélipèdes est plus fine chez *H. stenocoelus* que chez *H. rugosus* (comparer les photos D et E de la Fig. 2).

Comme nous l'avions mentionné lors de la description de *H. mararae* (CROSNIER 1991 : 427), seule cette espèce, parmi les *Hypocolpus*, avait été capturée à des profondeurs assez grandes (130-150 m), toutes les autres profondeurs mentionnées dans la littérature pour les captures d'*Hypocolpus* ne dépassant pas, jusqu'alors, 30 m. La capture d'une seconde espèce vivant aux alentours de 150 m de profondeur est donc intéressante. Ceci dit, le spécimen de LAURIE, d'après les indications fournies par cet auteur, a été capturé dans un récif de corail du golfe de Manaar ; aucune profondeur n'est indiquée, mais a priori, compte-tenu des autres récoltes de crustacés étudiées par LAURIE, elle ne devrait pas être bien grande ; ceci semblerait donc indiquer que *H. pararugosus* aurait une répartition bathymétrique assez large.

Remerciements

Bertrand RICHER DE FORGES (ORSTOM) nous a envoyé les récoltes parmi lesquelles le spécimen étudié ici a été trouvé. Paul CLARK (The Natural History Museum, Londres) nous a envoyé en prêt la plupart des spécimens nécessaires à cette étude. Maurice GAILLARD et Jacques REBIÈRE sont les auteurs respectivement des dessins et des photos qui illustrent cette note. Le Prof. Danièle GUINOT et Peter DAVIE ont bien voulu critiquer notre manuscrit. À tous nous adressons nos remerciements.

RÉFÉRENCES

CROSNIER A., 1991. — *Hypocolpus niararae*, espèce nouvelle de Polynésie française (Crustacea Decapoda Brachyura Xanthidae). *Bull. Mus natl Hist. nat.*, Paris, 4e sér., A **13** (3-4) : 423-428, fig. 1, pl. I.

DANA J. D., 1851. — On the Classification of the Cancroidea. *Am. J. Sci. Arts*, sér. 2 **12** (34): 121-131.

GALIL B. & VANNINI M., 1990. — Research on the coast of Somalia. Xanthidae, Trapeziidae, Carpiliidae, Menippidae (Crustacea Brachyura). *Tropical Zoology* **3**: 21-56, figs 1-8.

GUINOT-DUMORTIER D., 1960. — Révision des genres *Euxanthus* Dana et *Hypocolpus* Rathbun (Crust. Decap. Brach.). Remarques sur les cavités sous-hépatiques et les coaptations des *Hypocolpus*. *Mém. Mus. natn. Hist. nat.*, nlle série, A, Zool. **20** (2) : 153-218, figs 1-5, pls 1-12.

HAAN W. DE, 1833-1850. — Crustacea. *In* P. F. DE SIEBOLD, *Fauna Japonica sive Descriptio animalium, quae in itinere per Japoniam, jussu et auspiciis superiorum, qui summum in India Batava Imperium tenent,*

Source : MNHN, Paris

suspecto, annis 1823-1830 collegit, notis, observationibus et adumbrationibus illustravit. Lugduni Batavorum fasc. 1-8: I-XXI + VII-XVII + IX-XVI + 1-243, pl. 1-55, A-Q, circ., pl. 2.

HENDERSON J. R., 1893. — A Contribution to Indian Carcinology. *Trans Linn. Soc.* Lond., 2e sér. **5**. 325-458, pls 36-40.

LAURIE R. D., 1906. — Report on the Brachyura collected by Prof. Herdman, at Ceylon, in 1902. *In* W. A. HERDMAN, *Report to the Government of Ceylon on the Pearl Oyster Fisheries of the Gulf of Manaar.* Part V. Suppl. Rep. n° 40: 349-432, fig. 1-12, pls 1-2.

MIERS E. J., 1884. — Crustacea. *In Report on the zoological collections made in the Indo-Pacific Ocean during the voyage of H.M.S Alert 1881-1882. Part I The collections from Melanesia. Part II. The collections from the Western Indian Ocean.* London: 178-322, 513-575, pls 18-32, 46-51.

RATHBUN M. J., 1894. — Description of two new species of crabs from the western Indian Ocean, presented to the National Museum by Dr. W. L. Abbott. *Proc. U S. nain. Mus.* **17**: 21-24.

— 1909. — New crabs from the Gulf of Siam. *Proc biol. Soc. Wash* **22**: 107-114.

SERÈNE R., 1984. — Crustacés décapodes brachyoures de l'océan Indien occidental et de la mer Rouge. Xanthoidea : Xanthidae et Trapeziidae. Avec un addendum par A. Crosnier : Carpiliidae et Menippidae. *Faune tropicale* **24** : 1-400, fig. A-C + 1-243, pls I-XLVIII.

STRAHL C., 1861. — Carcinologische Beiträge. A. Ueber die Dekapoden Gattung *Euxanthus* Dana. B. Ueber *Cancer panope* Herbst. *Arch. Naturgesch.*, sér. 27 **1** : 101-106.

TAKEDA M., 1980. — A new Xanthid Crab from the Ryukyu Islands. *Bull. biogeogr. Soc. Japan* **35** (3): 39-44, figs 1-6.

VANNINI M., 1982. — Notes on somalian species of the genus *Hypocolpus* (Decapoda, Brachyura, Xanthidae) with the description of a new species. *Crustaceana* **42** (1): 101-105, figs 1-2, pl. 1.

YAMAGUCHI T. & BABA K., 1993. — Crustacean Specimens Collected in Japan by Ph. F. Von Siebold and H. Bürger and Held by the Nationaal Natuurhistorisch Museum in Leiden and other Museums. *In* T. YAMAGUCHI (ed.). *Ph. von Siebold and Natural History of Japan. Crustacea.* Carcinological Society of Japan: 145-570, figs 1-200 D + II A-F + 3 fig. n.n. + III A-D.

Source : MNHN, Paris

Bulletin du Muséum national d'Histoire naturelle, Paris, 4e série, 18, 1996
Section A, nos 3-4 : 565-570

Redescription des types de *Naushonia perrieri* (Nobili, 1904) (Crustacea, Decapoda, Laomediidae)

par Nguyen NGOC-HO

Résumé. — Les types de *Naushonia perrieri* (Nobili, 1904), récoltés à Djibouti, en mer Rouge sont décrits et figurés. Ils sont déposés au Muséum national d'Histoire naturelle, à Paris et comprennent un mâle désigné comme lectotype et une femelle paralectotype. Tous les deux sont en très mauvais état et n'avaient jamais été réexaminés depuis leur description originale par NOBILI, qui comporte plusieurs erreurs. Une clé de comparaison avec les autres espèces du genre *Naushonia* est présentée.

Mots-clés. — Crustacea, Decapoda, Thalassinidea, Laomediidae, taxonomie, *Naushonia*, mer Rouge.

Redescription of the types of *Naushonia perrieri* (Nobili, 1904) (Crustacea, Decapoda, Laomediidae)

Abstract. — The type material of *Naushonia perrieri* (Nobili, 1904) from Djibouti, Red Sea is described and figured. The newly designated lectotype male and paralectotype female are deposited in the Muséum national d'Histoire naturelle, Paris. Both specimens are in very poor condition and had never been reexamined since their original description by NOBILI, which contains a number of mistakes. A key to the known species of *Naushonia* is provided.

Key-words. — Crustacea, Decapoda, Thalassinidea, Laomediidae, taxonomy, *Naushonia*, Red Sea.

N. NGOC-HO, *Muséum national d'Histoire naturelle, Laboratoire de Zoologie (Arthropodes), 61 rue de Buffon, F-75231 Paris cedex 05.*

INTRODUCTION

Le genre *Naushonia* Kingsley, 1897 comprend actuellement six espèces : *N. crangonoides* Kingsley, 1897, *N. portoricensis* (Rathbun, 1901), *N. perrieri* (Nobili, 1904), *N. macginitiei* (Glassell, 1938), *N. panamensis* Martin & Abele, 1982 et *N. lactoalbida* Berggren, 1992. Quatre d'entre elles sont américaines et proviennent soit de la côte atlantique (*N. crangonoides*), soit de la côte pacifique (*N. macginitiei*), de la mer Caraïbe (*N. portoricensis*) ou du Panama (*N. panamensis*). Seules *N. perrieri* et *N. lactoalbida* ont été récoltées dans l'océan Indien, la première à Djibouti, en mer Rouge, la deuxième en Mozambique.

N. perrieri a d'abord été décrite par NOBILI (1904, 1906) sous le nom de *Coralliocrangon Perrieri* et prend le nom actuel à la suite de la mise en synonymie de *Coralliocrangon* avec *Naushonia* par CHACE (1939). Le matériel-type de *N. perrieri* est déposé au Muséum national d'Histoire naturelle, Paris et comprend deux spécimens de petite taille, un mâle désigné ici comme lectotype et une femelle paralectotype. Tous les deux sont en très mauvais état et n'ont jamais

Source : MNHN, Paris

été réétudiés depuis la description originale de Nobili, description qui, comme ses illustrations, comporte plusieurs erreurs.

Les types de *N. perrieri* sont redécrits et figurés afin de permettre une comparaison avec les autres espèces du genre *Naushonia*. Les dimensions indiquées se rapportent à la longueur de la carapace (l.c.) mesurée de l'extrémité du rostre au bord postérieur de la carapace.

Genre **NAUSHONIA** Kingsley, 1897

Naushonia perrieri (Nobili, 1904)
(Fig. 1)

Coralliocrangon Perrieri Nobili, 1904 : 234; 1906 : 82; DE MAN 1920 : 257.

Naushonia perrieri; CHACE 1939 : 527; GURNEY & LEBOUR 1939 : 609; GOY & PROVENZANO 1978 : 258; 1979 : 353, figs 6-8; MARTIN & ABELE 1982 : 482; BERGGREN 1992 : 522.

MATÉRIEL EXAMINÉ. — Djibouti, H. Coutière coll. 1897 : 1 ♂, l.c. 6,5 mm (lectotype, MNHN-Th202a), fragmenté en trois morceaux, mandibule et maxillule droites et premiers péréiopodes présents; 1 ♀, l.c. 4,5 mm (paratectotype, MNHN-Th202b), fragmenté en deux, maxillule et maxille droites, premier et deuxième maxillipèdes droits, pléopodes 1-5 présents.

Les spécimens ont été colorés par une solution diluée de noir de Chlorazol pendant une demi-heure environ avant l'observation.

DESCRIPTION

Carapace (Fig. 1a), avec *linea thalassinica* distincte mais sillon cervical très faible, parcourue longitudinalement, de la base du rostre environ jusqu'au bord postérieur de la carapace, par une fine crête médiane accompagnée de chaque côté de deux crêtes latérales obliques, plus courtes, ces dernières sont limitées à la partie antérieure de la carapace, en avant du sillon cervical. Rostre large (Fig. 1f), cachant presque entièrement les yeux, arrondi en avant et bordé d'une rangée de denticules, avec un faible sillon médian; dents postorbitaires simples, fortes. Abdomen (Fig. 1b) à pleurons arrondis postérieurement, ceux du deuxième segment recouvrant en partie ceux du premier et du troisième.

Pédoncules antennulaires (Fig. 1f, g) séparés à leur base par une longue épine du proépistome, visible en vue ventrale; premier article avec une épine ventro-distale, deuxième article avec deux épines dorso-distales; flagelles courts.

Pédoncules antennaires (Fig. 1f, g) : troisième article avec une épine mésio-subdistale; quatrième article avec une épine exteme subdistale et une mésio-distale, face dorsale recouverte d'une grande écaille antennaire avec quatre petites dents externes et bordée de soies du côté interne.

Mandibule (Fig. 1h) : bord sécant muni de petites dents obtuses, palpe à trois articles.

Premier maxillipède (Fig. 1i) : exopodite composé d'une partie basale élargie et d'une partie distale étroite, se terminant par un fouet muni de soies; endopodite à extrémité élargie en spatule triangulaire; épipodite probablement cassé laissant une trace.

Deuxième maxillipède avec épipodite en lame triangulaire.

Source : MNHN, Paris

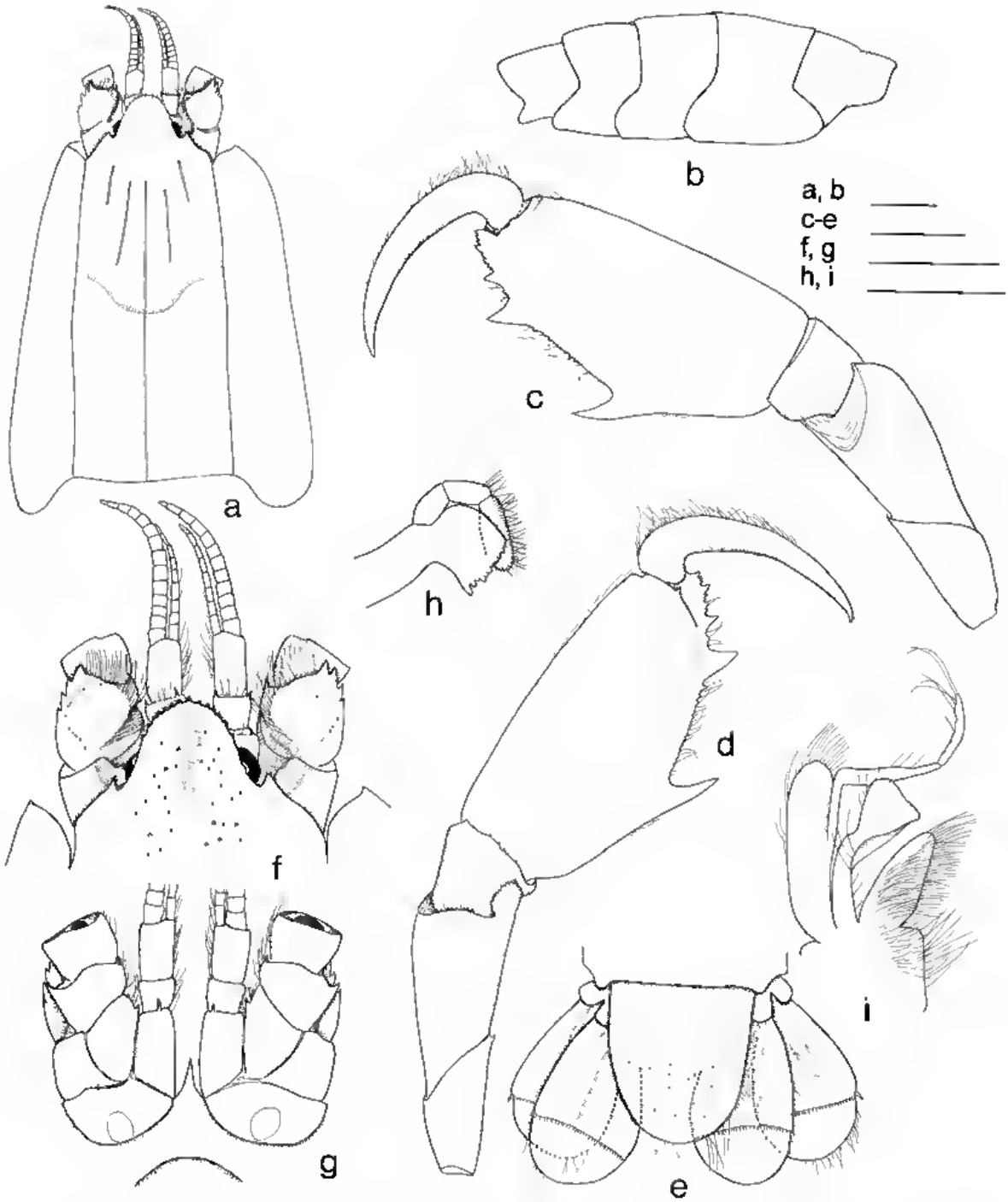


FIG. 1. — *Naushonia perrieri* (Nobili). a-h : lectotype (MNHN-Th202a). a, carapace, vue dorsale ; b, abdomen, vue latérale ; c, premier péréiopode droit, face mésiale ; d, face externe ; e, telson et uropodes ; f, région antérieure de la carapace, vue dorsale ; g, pédoncules antennulaires et antennaires, vue ventrale ; h, mandibule droite, face externe. i : paralectotype (MNHN-Th202b), premier maxillipède droit, face externe. Échelles : a-g, 1 mm ; h-i, 0,5 mm.

Source : MNHN, Paris

Premier péréiopode mâle (Fig. 1c, d) : mérus avec des denticules au bord distal et une expansion arrondie denticulée ventro-externe, recouvrant une partie du carpe. Carpe triangulaire muni de denticules au bord disto-externe. Propode deux fois plus long que le mérus et environ deux fois plus long que large, avec une grande dent vers le milieu du bord ventral, une grande dent subdistale précédée par trois dents plus petites et des denticules; bord ventral finement serrulé entre les deux grandes dents; une spinule externe distale au niveau de l'articulation avec le dactyle. Dactyle d'une longueur environ égale aux deux tiers de celle du propode, arqué, recourbé, inerme, à extrémité effilée.

Péréiopodes 2-5 manquant chez le lectotype, tous manquant chez le paralectotype, certaines branchies persistent mais sont difficiles à observer, toutefois les épipodites sont présents sur les P1-4.

Pléopode 1 absent chez le lectotype, présent, très petit, à deux articles chez le paralectotype. Pléopodes 2-5 perdus chez le lectotype, présents chez le paralectotype, leurs deux rames lancéolées.

Telson (Fig. 1e) légèrement plus long que large, inerme, à bord postérieur arrondi.

Uropodes (Fig. 1e) : basipodite bilobé; endopodite et exopodite à peu près de même longueur, à bord postérieur arrondi; endopodite avec une carène longitudinale, exopodite avec deux carènes, toutes très faibles; endopodite et exopodite pourvus au tiers postérieur d'une suture transversale munie de spinules et se terminant par une épine externe plus forte.

Remarques

L'examen des types de cette espèce permet d'accepter pleinement son placement par Chace dans le genre *Naushonia*. Elle permet aussi de mieux définir l'espèce et de corriger certains des caractères morphologiques mal observés dans la description originale de Nobili.

Naushonia perrieri peut être définie comme une espèce à bord rostral antérieur arrondi, denticulé; épines postorbitales simples; *linea thalassinica* distincte; sillon cervical faible; une crête longitudinale médiane et deux paires de crêtes obliques sur la carapace; écaille antennaire avec quatre petites dents externes; palpe mandibulaire à trois articles; péréiopode 1 à mérus inerme avec une expansion distale, denticulée, ventro-externe, propode inerme au bord dorsal, bord ventral avec, sur la moitié distale, deux grandes dents, des dents plus petites et des denticules, dactyle inerme; telson inerme, à bord postérieur arrondi; uropodes avec exopodite et endopodite à peu près de même longueur, à sutures complètes, munies de spinules. La formule branchiale complète de l'espèce ainsi que la morphologie des P1-4 ne peuvent pas être précisées actuellement.

À l'exception des épines postoculaires, simples, et des denticules du bord ventral entre les deux grandes dents du propode des P1, *N. perrieri* ne présente pas de caractères communs avec *N. lactoalbida* qui en est géographiquement l'espèce la plus proche. Elle se distingue aisément des espèces américaines comme le montre la clé ci-dessous.

Clé de détermination des espèces du genre Naushonia
(adaptée de Martin & Abele 1982 et Berggren 1992) :

1. Épine postorbitaire bifide ou trifide 2
— Épine postorbitaire simple 4

Source : MNHN, Paris

2. Écaille antennaire avec dix dents externes ou plus; exopodite des uropodes avec cinq épines externes, telson inerme ..... *N. crangonoides*
— Écaille antennaire avec moins de dix dents externes; exopodite des uropodes avec deux épines externes, telson muni de dents aux bords latéraux 3
3. Telson avec une dent aux bords latéraux; dent terminale de l'écaille antennaire fortement recourbée médialement ..... *N. portoricensis*
— Telson avec trois dents aux bords latéraux; dent terminale de l'écaille antennaire droite, non recourbée médialement ..... *N. macginitei*
4. Rostre pointu vers l'avant 5
— Rostre à bord antérieur arrondi; carapace avec une crête longitudinale médiane et deux paires de crêtes obliques; mérus de P1 avec une expansion distale ventro-externe; telson inerme ..... *N. perrieri*
5. Propode de P1 avec deux fortes dents proximales ventrales, dactyle avec dents proximales dorsales; telson avec une dent aux bords latéraux ..... *N. panamensis*
— Propode de P1 sans dents proximales ventrales, dactyle inerme au bord dorsal; telson avec quatre dents aux bords latéraux ..... *N. lactoalbida*

Remerciements

L'auteur remercie Michèle DE SAINT-LAURENT qui a relu le manuscrit.

RÉFÉRENCES

BERGGREN M., 1992. — *Naushonia lactoalbida*, new species (Decapoda: Thalassinidea: Laomediidae), a mud shrimp from Inhaca Island, Moçambique. *J. Crust. Biol.* **12** (3) : 514-522, figs 1-6.

CHACE F. A. Jr., 1939. — On the systematic status of the crustacean genera *Naushonia*, *Homoriscus* and *Coralliocrangon*. *Ann. Mag. Nat. Hist.* ser. **11** (3): 524-530, figs 1-14.

GLASSELL S. A., 1938. — New and obscure decapod Crustacea from the West American coasts. *Trans. San Diego Soc. Nat. Hist.* **8** (33): 411-454.

GOY J. W. & PROVENZANO A. J., 1978. — Larval development of the rare burrowing mud-shrimp *Naushonia crangonoides* Kingsley (Decapoda: Thalassinidea: Laomediidae). *Biol. Bull.* **154** : 241-261.

— 1979. — Juvenile morphology of the rare burrowing mud-shrimp *Naushonia crangonoides* Kingsley, with a review of the genus *Naushonia* (Decapoda: Thalassinidea: Laomediidae). *Proc. Biol. Soci. Wash.* **92** (2): 339-359, figs 1-8.

GURNEY R. & LEBOUR M. V., 1939. — The larvae of the Decapod Genus *Naushonia*. *Ann Mag Nat. Hist.* ser. **11** (3): 609-614, figs 1-14.

KINGSLEY J. S., 1897. — On a new genus and two new species of macrurous Crustacea. *Bull. Essex Inst.* **27**: 95-99.

MAN J. G. DE, 1920. — The Decapoda of the Siboga Expedition. Part IV. Families Pasiphaeidae, Stylodactylidae, Hoplophoridae, Nematocarcinidae, Thalassocaridae, Pandalidae, Psalidopodidae, Gnathophyllidae, Processidae, Glyphocrangonidae and Crangonidae. *Siboga Exped. Monogr.* **39** (a3): 1-318, pls 1-25.

MARTIN J. W. & ABELE L. G., 1982. — *Naushonia panamensis*, new species (Decapoda: Thalassinidea: Laomediidae) from the Pacific coast of Panama with notes on the genus. *Proc. Biol. Soc. Wash.* **95** (3): 478-483, figs 1-3.

Source : MNHN, Paris

NOBILI G., 1904. — Diagnoses préliminaires de vingt-huit espèces nouvelles de Stomatopodes et Décapodes macroures de la mer Rouge. *Bull. Mus. natl d'Hist. nat.*, Paris **10** (5) : 228-238.

— 1906. — Faune carcinologique de la mer Rouge : Décapodes et Stomatopodes. *Ann. Sci. Nat.* Zool. **9** (4) : 1-347, pls. 1-11.

RATHBUN M. J., 1901. — The Brachyura and Macrura of Porto Rico. *Bull. U.S. Fish. Comm. for 1900* **2**: 1-127.

Source : MNHN, Paris

Bulletin du Muséum national d'Histoire naturelle, Paris, 4e série, **18**, 1996
Section A, nos 3-4 : 571-587

Découverte du genre *Archipolydesmus* en Algérie : description de trois espèces nouvelles (Diplopoda, Polydesmida, Polydesmidae)

par Ourida ABROUS-KHERBOUCHE et Jean-Paul MAURIÈS

Résumé. — Le genre *Archipolydesmus*, jusqu'à présent connu par cinq espèces de France, d'Espagne et du Maroc, est récolté pour la première fois en Algérie. Trois espèces nouvelles sont décrites. Elles ont été découvertes dans deux parcs nationaux du Nord de l'Algérie : une dans celui de Chréa (sud d'Alger) et les deux autres dans celui du Djurdjura (est d'Alger). Une liste récapitulative des vingt-cinq genres et cinquante et une espèces de diplopodes cités d'Algérie est donnée, avec leurs références bibliographiques.

Mots-clés. — *Archipolydesmus*, Diplopoda, Algérie.

Discovery of genus *Archipolydesmus* in Algeria : description of three new species (Diplopoda, Polydesmida, Polydesmidae)

Abstract. — The genus *Archipolydesmus*, until now known by five species from France, Spain and Morocco, is discovered for the first time in Algeria, in two national parks. Three new species are described : one of them in the National Park of Chrea (south of Algiers), and two in the National Park of Djurdjura (east of Algiers). A list of the Millipeds (twenty-five genera – fifty-one species) cited until today from Algeria is given, with their bibliographic references.

Key-words. — *Archipolydesmus*, Diplopoda, Algeria.

O. ABROUS-KHERBOUCHE, *Laboratoire d'écologie animale, I.S.N., U.S.T.H.B , B.P 32, El Alia, Bab-Ezzouar, Alger (Algérie).*
J.-P. MAURIÈS, *Muséum national d'Histoire naturelle, Laboratoire de Zoologie (Arthropodes), 61 rue de Buffon, F-75231 Paris cedex 05*

INTRODUCTION

Durant l'étude effectuée par l'un de nous (O. A.-K.) sur la pédofaune du parc national de Chréa, de décembre 1989 à décembre 1990 (ABROUS-KHERBOUCHE 1996), et sur celle du parc national du Djurdjura, de novembre 1992 à novembre 1994, douze espèces de Diplopodes ont été récoltées (tableau ci-après).

Source : MNHN, Paris

Liste des espèces et nombre d'individus récoltés dans les parcs nationaux de Chréa et du Djurdjura.

Espèces	P. N. Chréa	P. N. Djurdjura
Cylindroiulus (Phalloiulus) distinctus (Lucas, 1846)	244	89
Cylindroiulus (Phalloiulus) aff. algerinus (Lucas, 1846)	–	43
Ommatoiulus gauthieri (Brolemann, 1931)	85	–
Ommatoiulus aumalensis (Brolemann, 1925)	–	347
Brachyiulus sp.	2 j.	–
Glomeris conspersa C.L. Koch, 1847	20	–
Glomeris flavomaculata Lucas, 1846	–	2
Polydesmus (Brachydesmus) superus Latzel, 1884	3	–
Polydesmus (Brachydesmus) proximus Latzel, 1889	2	–
Archipolydesmus chreensis n.sp.	50	–
Archipolydesmus kabylianus n.sp.	–	38
Archipolydesmus fodili n.sp.	–	210

Dans cette liste, les trois dernières sont des espèces inédites qui appartiennent à un genre qui n'était encore connu que de l'extrême Sud de la France, de l'Espagne et du Maroc : *Archipolydesmus* Attems, 1898 (= *Hispaniodesmus* Verhoeff, 1910 = *Miradoria* Attems, 1952).

Ce genre qui, dans la famille des Polydesmidae (*cf.* HOFFMAN 1980) est proche du grand genre *Polydesmus*, s'en distingue par un caractère morphologique très visible extérieurement : la présence sur le dos des métatergites, non de simples mamelons plus larges que longs, peu proéminents et peu nombreux, mais de nombreux petits tubercules serrés, plus longs que larges, et surmontés d'une soie (VERHOEFF 1910). Du point de vue des caractères gonopodiaux, *Archipolydesmus* se distingue de *Polydesmus* par l'absence de pulvillum et la forme, particulière au genre, très allongée et sinueuse de la vésicule séminale.

La première espèce décrite l'a été du Maroc, en même temps que le genre : *Archipolydesmus maroccanus* Attems, 1898. Puis, ont été décrites successivement :

— *panteli* (Brölemann, 1900) du Centre-Est de l'Espagne (prov. Cuenca), type de *Hispaniodesmus* Verhoeff, 1910;

— *bedeli* (Brölemann, 1902) d'Espagne centrale (prov. Segovia);

— *ribauti* (Brolemann, 1926) de l'extrême Sud de la France (Pyrénées-Orientales) et d'Espagne du Nord (prov. Gérona);

— *terreus* (Attems, 1952) du Pays basque espagnol, prov. Guipuzcoa (= *Miradoria terrea*);

— *osellai* Ceuca, 1968, du Nord de l'Espagne (prov. Huesca).

Source : MNHN, Paris

Archipolydesmus s'ajoute aux vingt-quatre genres de Diplopodes déjà connus de la faune d'Algérie; quant au nombre des espèces recensées, il s'élève à cinquante et un, compte tenu des quelques taxa douteux et des trois nouveaux. Ce nombre, qui est le plus fort des trois pays du Maghreb, (vingt-quatre pour la Tunisie, quarante-cinq pour le Maroc) est relativement modeste, comparé à celui d'autres pays circumméditerranéens, comme l'Espagne (150-170), la France (250-300), ou l'Italie (450-500). Si cette faiblesse s'explique en partie par la pondération minorante due à la situation géographique, notamment la proximité de la zone saharienne, elle indique néanmoins que la faune myriapodologique de l'Algérie offre encore un potentiel de découvertes assez important.

Trente-huit de ces espèces étaient déjà citées par BROLEMANN 1921, et quarante-deux par SCHUBART 1953. Ensuite, pour ce qui concerne les diplopodes, les citations concernant les dix autres espèces, nouvelles pour la Science ou non, citées d'Algérie, sont dispersées dans une dizaine de travaux ponctuels, soit sur le plan taxinomique, soit sur le plan géographique. C'est pourquoi il nous a paru nécessaire, dans un souci de mise à jour, de publier ici, en fin d'article, la liste des diplopodes d'Algérie (dans la nomenclature actuelle), avec les références bibliographiques les concernant.

MATÉRIEL ÉTUDIÉ

Le matériel récolté récemment par le premier auteur dans les parcs nationaux mentionnés plus haut, est le support principal du présent travail. Une partie (matériel-type notamment) a été intégrée dans la « Collection Myriapodes du Muséum national d'Histoire naturelle », et le reliquat, propriété du premier auteur, est mentionné sous l'abréviation « Coll. A.-K. ». La présente étude inclut en outre quelques matériaux issus des collectes « Biospeologica » qui avaient été récoltés autrefois dans le Djurdjura par Peyerimhoff (n° 436A, 715 et 916) et qui n'avaient jusqu'à ce jour jamais été étudiés; ces derniers spécimens se rapportent tous à l'une des trois espèces décrites, la deuxième, *A. kabylianus*.

DESCRIPTION DES ESPÈCES NOUVELLES

Les trois espèces algériennes décrites ci-après ne se distinguent pas de leurs congénères par leurs caractères externes; le nombre des aires polygonales métatergales est le même que chez quatre des six espèces (seuls *ribauti* et *panteli* en ont davantage).

En revanche, les gonopodes des mâles, qui possèdent le court solénomérite prolongeant l'ampoule spermatique (vésicule séminale) très allongée et sinueuse, caractéristique du genre, se singularisent par une plus grande simplicité de l'ensemble du gonopode et par un relativement grand développement, et en largeur, et en longueur, de la partie tibiotarsale.

L'importance en nombre du matériel examiné a permis d'apprécier l'inhabituelle grande variabilité de la structure de ces gonopodes, qui se traduit de deux manières :

Source : MNHN, Paris

1) chez les trois espèces, par de notables différences intraspécifiques dans le développement des découpures en lobes ou dents du tibiotarse et des différents processus dentiformes qui ornent le fémur ;

2) chez la première espèce décrite, *chreensis*, où il existe deux formes sympatriques qui, du point de vue des caractères externes, ne se distinguent que par la taille (on observe quelques grands individus, et de nombreux petits), les gonopodes de la petite forme sont plus simples que ceux de la grande.

Concernant les caractères des femelles, il faut rappeler que ceux d'une seule espèce sont connus, ceux de la plus septentrionale, *A. ribauti*. La comparaison avec les espèces algériennes est très décevante, car les variations morphologiques observées sont si faibles qu'elles n'apparaissent pas comme caractéristiques ou propres à définir telle ou telle espèce : les vulves sont identiques. Le profil des crêtes pleurosternales transverses montre une assez grande variabilité intraspécifique, et les P.2 chez qui, rappelons-le, coxites et sternite sont soudés en une plaque coxosternale subtrapézoïdale formant clapet au-dessus des vulves, ne montrent que de faibles variations dont il est difficile d'apprécier la nature et la valeur taxinomique.

En outre, se pose pour nous, un autre problème, qui concerne plus précisément les deux espèces du Djurdjura, qui sont sympatriques. Curieusement en effet, toutes les femelles récoltées sur les différents sites de ce massif sont toutes de petite taille, contrairement aux mâles qui, en plus des caractères gonopodiaux, se distinguent aisément par leur taille : *kabylianus* est plus grand que *fodili*. S'il est relativement aisé d'attribuer certaines de ces femelles à *A. fodoli*, on ne peut en attribuer aucune autre à *kabylianus*, à moins d'admettre que chez cette espèce, les femelles sont nettement plus petites que les mâles, ce qui nous paraît peu vraisemblable et en tout cas serait une « rareté » chez les myriapodes. C'est pourquoi nous ne donnons pas ici les caractères femelles de *kabylianus*, le problème qu'ils posent nécessitant des investigations supplémentaires.

Archipolydesmus chreensis n.sp.

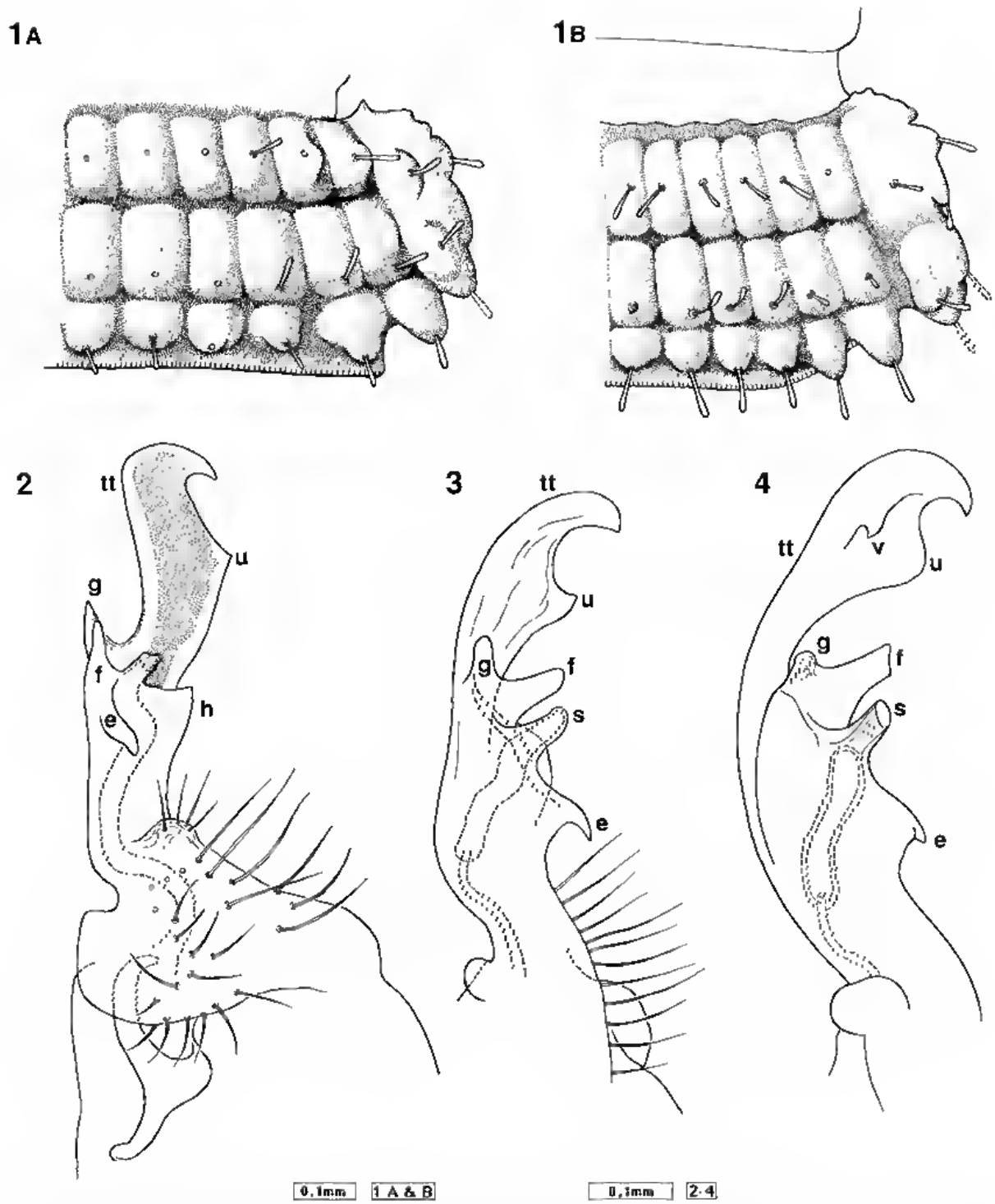
Localité-type. — Algérie, Wilaya de Blida, atlas de Blida, parc national de Chréa : Pic Abd-el-Kader, versant nord, alt. 1600 m, pièges en forêt de *Cedrus atlantica*, 19.II.1990, 1 ♂ holotype (petite forme) (MNHN Paris, Collection Myriapodes, JC 291).

Topotypes. — 18.XII.1989, 30 ♂♂ (28 petits, 2 grands) et 3 ♀♀ ; 27.I.1990, 10 ♂♂ (9 petits, 1 grand), 6 ♀♀ (MNHN Paris, Collection Myriapodes, JC 291).

Caractères morphologiques externes

Coloration claire, souvent dépigmentée, souvent ochracée, plus claire antérieurement et ventralement ; pattes jaunâtres.

Source : MNHN, Paris



FIGS 1-4. — *Archipolydesmus chreensis* n.sp. ♂ holotype, ♂ topotypes, ♀ paratype : 1, moitiés droites des huitièmes (1A) et neuvièmes (1B) anneaux d'un ♂ paratype. 2, gonopode gauche du ♂ holotype, en vue caudale. 3, le même en vue médiale. 4, gonopode gauche d'un ♂ topotype (du 18.XII.1989), en vue médiale.

Source : MNHN, Paris

Corps bombé, à côtés parallèles, à carènes faiblement saillantes : parmi les mâles récoltés sur la localité type, il a été constaté la coexistence de petits (de beaucoup les plus nombreux, dont le mâle holotype et trente-sept des quarante mâles examinés) et de plus grands individus qui ne se distinguent ni par l'ornementation métatergale, ni par d'autres caractères externes.

Mensurations du mâle holotype, de deux mâles (un petit et un grand) et d'une femelle topotype (en mm) :

	♂ holotype	Petit ♂	Grand ♂	♀
Longueur du corps	8,50	7,90	10,50	10,50
Largeur de la tête	0,81	0,84	1,20	1,15
Largeur du collum	0,60	0,66	1	0,90
T.7 : largeur	1,10	1,15	1,30	1,25
T.7 : hauteur du métazonite	0,80	0,85	1,20	1
T.7 : diamètre du prozonite	0,70	0,70	1,10	0,90

Tête courte, convexe, couverte d'une pilosité courte et dense. Bourrelet sous-antennaire arrondi en arrière.

Antennes assez longues, à sept antennomères en cylindres modérément claviformes, mesurant 0,10 + 0,16 + 0,26 + 0,20 + 0,21 + 0,28 + 0,08 = 1,19 mm chez le mâle holotype.

Stipes mandibulaires bombés.

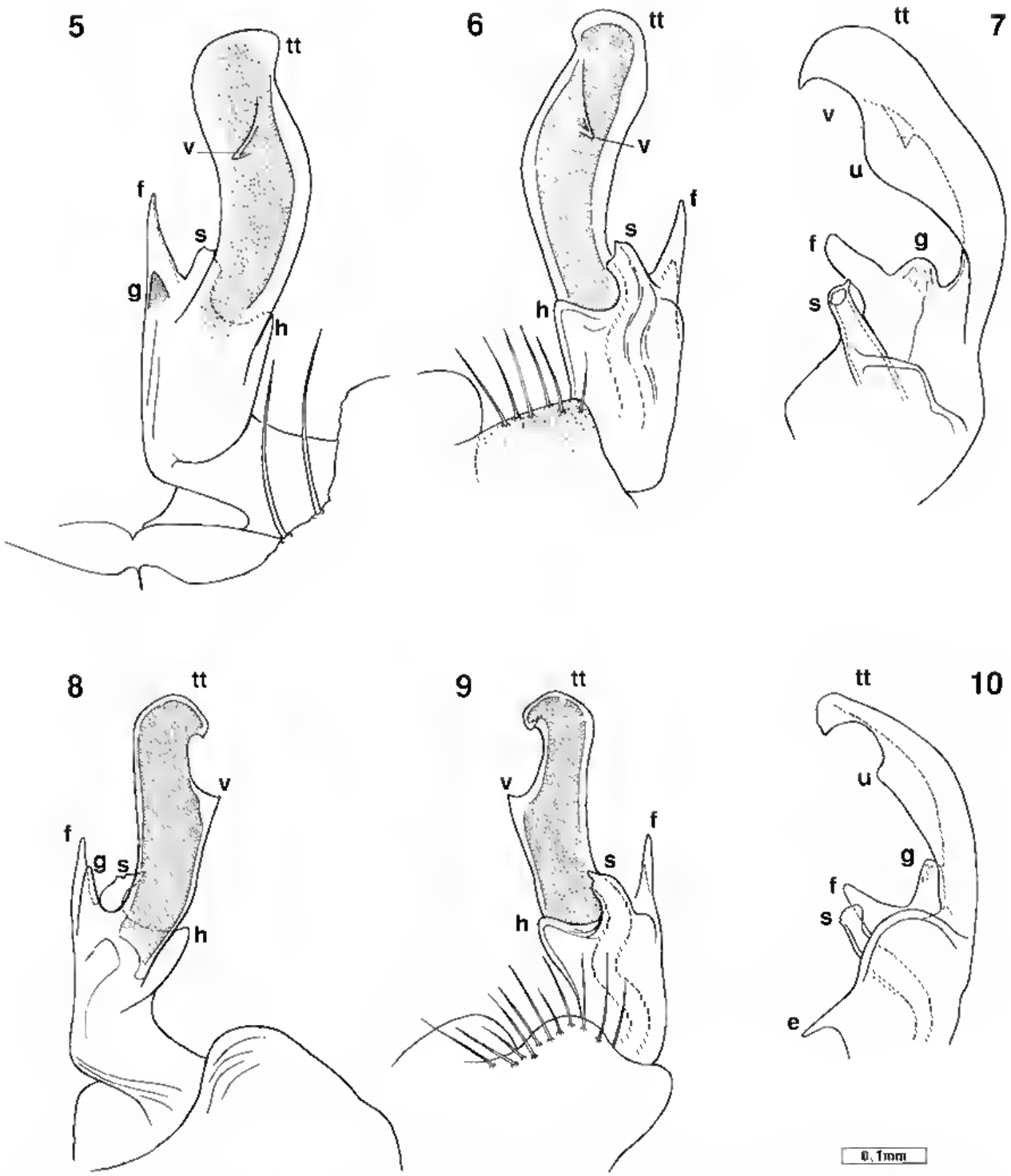
Collum (T.1) plus étroit que la tête, en ovale-réniforme (très convexe en avant, faiblement échancré en arrière). Sa surface est légèrement bombée et découpée en petites aires polygonales faiblement convexes portant chacune en son centre une petite soie claviforme ; ces polygones sont répartis en quatre rangs : un rang antérieur de 7 + 7 polygones disposés en arc de cercle épousant le bord antérieur ; le deuxième rang est moins arqué et compte 4 + 4 polygones ; les troisièmes et quatrièmes rangées sont sinueuses et comptent respectivement 4 + 4 et 3 + 3 polygones.

Si le collum (surtout) et le T.3 sont plus étroits que la tête (joues comprises), le T.2 est légèrement plus large. A partir du T.4, qui a la même largeur que la tête, la largeur des anneaux croît assez rapidement pour atteindre sa largeur maximale au T.7. Les carènes sont un peu repoussées vers l'avant sur les anneaux antérieurs, notamment les T.3 et T.4.

A partir du T.2, tous les anneaux comptent trois rangs de polygones sétifères (Figs 1A, B). Ces polygones, en général au nombre de 6 + 6 (quelquefois 5 + 6 ou même 5 + 5 sur les anneaux antérieurs ou postérieurs) sont plats, de forme allongée sur les premiers et deuxièmes rangs, de forme arrondie sur les troisièmes où ils sont peu saillants, sauf les deux ou trois plus externes, qui forment des cônes saillants en arrière, à l'instar de l'angle postérieur des carènes.

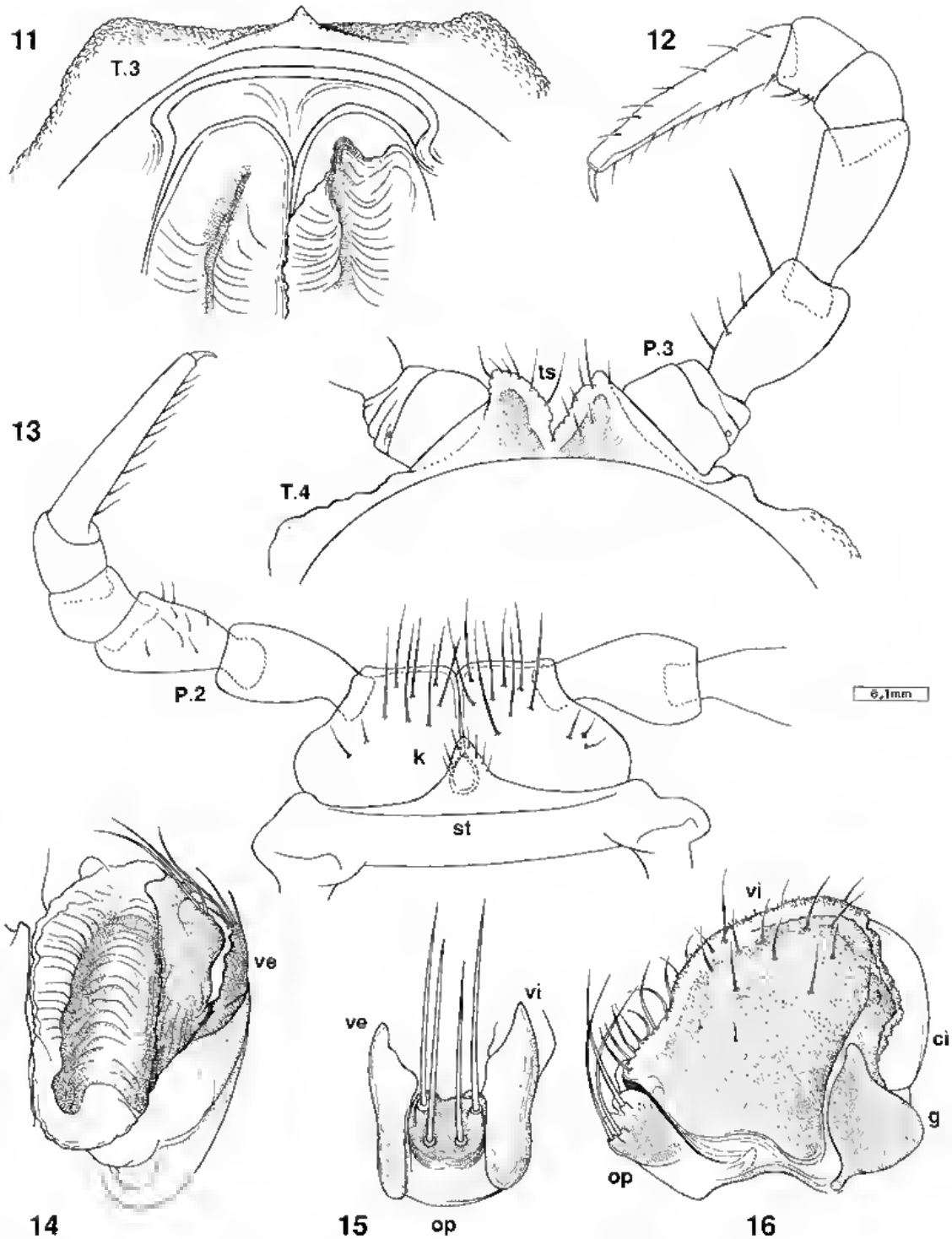
Sur les anneaux non porifères, le bord externe des carènes est faiblement pluri-échancré en une (ou deux ou trois) faible(s) denticulation(s) antérieure(s) suivie(s) de trois lobules sétifères dont le plus postérieur forme l'angle caudal externe de la carène, qui est séparé du cône le plus

Source : MNHN, Paris



FIGS 5-10. — *Archipolydesmus chreensis* n.sp. Comparaison des gonopodes des ♂♂ topotypes des deux formes : 5-7, la grande forme, normale ; 8-10, la petite forme. 5, gonopode droit d'un ♂ topotype, en vue orale. 6, le même en vue caudale. 7, le même en vue latérale. 8, gonopode droit d'un ♂ topotype de la petite forme, en vue orale. 9, le même en vue caudale. 10, le même en vue latérale.

Source : MNHN, Paris



FIGS 11-16. — *Archipolydesmus chreensis* n.sp. ♀ : 11, bandeau pleurosternal et partie distale des vulves d'une ♀ paratype, en vue orale, 12, bandeau pleurosternal du quatrième anneau et base des P.3 de la même, en vue orale. 13, P.2 isolée de la même, en vue orale. 14, vue distale de la vulve gauche. 15, opercule de la vulve, avec ses quatre grandes soies et base des valves externes et internes. 16, vue médiale de la vulve gauche.

Source : MNHN, Paris

externe du rang postérieur de polygones sétifères par une échancrure peu profonde sur les anneaux antérieurs, en angle droit sur les moyens, en angle plus aigu sur les postérieurs.

Les carènes des anneaux porifères (Fig. 1B) diffèrent par l'existence d'un lobule sétifère supplémentaire, les deux lobes postérieurs constituant une grosse verrue globuleuse saillante dans laquelle s'ouvre latéralement l'ozopore.

L'angle postérieur des carènes est aigu sur les T.16, T.17 et T.18 et, sur les deux derniers (T.17 et T.18) ne dépasse que légèrement le bord postérieur; sur le T.19, il ne dépasse pas et la verrue porifère est très réduite et non saillante.

Les soies tergales, toujours très petites sont généralement en massue ou en bâtonnet; elles sont parfois, sur les polygones antérieurs, plutôt spiniformes.

Le telson est conique, à pointe émoussée, orné de verrues polygonales et de quatre rangs transverses de dix, cinq, deux et deux soies dont les postérieures sont les plus longues. Valves anales peu bombées, à rebords saillants. Valve sous-anale en triangle arrondi à sommet muni d'une paire de soies longues.

Pattes assez longues, mesurant 1,15 mm de long chez le mâle holotype, dont 0,44 mm pour le tarse, qui est grêle et se termine par un uncus simple et court.

Caractères sexuels du mâle

Gonopodes (Figs 2-4, 5-10) plus proches, par leur conformation générale [brièveté du solénomérite (s) et simplicité du tibiotarse (tt)] des formes franco-espagnoles (*panteli*, *ribauti* et *osellai*) que de l'espèce marocaine, type du genre. Ils se signalent par la plus grande longueur relative du tibiotarse qui est élargi en raquette et se termine en une dent rétroarquée, mais surtout par la partie fémorale. Celle-ci se distingue bien du tibiotarse (tt) par sa plus forte chitinisation et est limitée distalement, à l'intérieur par deux dents érigées de longueur inégale (f et g), à l'extérieur par un ressaut angulaire (h) d'où se détache le court solénomérite (s) et, ventralement et plus proximalement, une dent aiguë (e) inclinée vers la base. À signaler que les gonopodes des grands mâles présentent quelques différences (voir Figs 4-7), notamment la présence d'un denticule (v) sur la face concave du tibiotarse et la réduction de la dent fémorale (g).

Hanches des P.7 plus écartées que celles de la P.6, à sternite excavé.

Caractères sexuels de la femelle (Figs 11-16)

Coxosternite des P.2 illustré figure 13 ; le sternite (st) et les hanches (k), bien que distincts, sont soudés en une seule plaque subtrapézoïdale qui vient s'ajuster au-dessus du vestibule vulvaire et le ferme comme un clapet.

Au-dessus du vestibule vulvaire, l'arc pleuro-sternal s'élargit en un bandeau orné de chaque côté d'un large lobe arrondi proéminent et, sagittalement, d'une courte pointe (Fig. 11).

Vulves (Figs 14-16) très semblables à celles de *ribauti*, par leur forme générale en hémisphère très fortement aplati parasagittalement, à profil latéral arrondi, à valves latérales externe (ve) et interne (vi) fortement développées et très symétriques, à valves antérieure (opercule : op) et postérieure (gorgerin : g) petites et situées très basalement. Si ce dernier (g) ne présente aucune particularité qui le distingue des valves latérales, l'opercule (op) forme un clapet subtrapézoïdal dont une aire subcarrée plus chitinisée est garnie de quatre très fortes soies (comme chez *ribauti*). Dans le large espace non chitinisé ménagé entre les deux valves latérales, le cimier (ci), marqué d'une quinzaine de canelures transverses, de forme ovale allongée (en vue distale-

Source : MNHN, Paris

orale, Fig. 14), est partagé en deux zones subégales par une crête longitudinale fortement proéminente dans et le long de laquelle court la gouttière apodématique.

P.3 (Fig. 12) se signalant par la présence, en avant et entre les coxites, d'une paire d'excroissances sternales triangulaires (ts).

Archipolydesmus kabylianus n.sp.

Localité-type. — Algérie, Wilaya de Tizi-Ouzou, massif et parc national du Djurdjura, à Tala-Guilef, versant nord, alt. 1420 m, pièges en forêt de *Cedrus atlantica*, 17.V.1993, 1 ♂ holotype, 1 ♂ paratype (MNHN Paris, Collection Myriapodes JC 292), 25 ♂♂ (Coll. A.-K.).

Topotypes. — 20.VI.1993, 1 ♂ (Coll. A.-K.).

Autres localités. — Algérie, Wilaya de Tizi-Ouzou : massif et parc national du Djurdjura, à Tala-Guilef, versant nord, alt. 1420 m, pièges en pâturage, 17.V.1993, 1 ♂; 16.V.1994, 3 ♂♂ (Coll. A.-K.); 16.V.1994, 2 ♂♂, (MNHN Paris, Collection Myriapodes JC 292);

— massif et parc national du Djurdjura, à Tala-Guilef, versant sud, alt. 1420 m, pièges en pâturage, 17.V.1993, 4 ♂♂ (Coll. A.-K.);

— Draa El Mizan, Tesserefts Tissoukdel, 31.X.1912, Biospeologica 715, 1 ♂ (MNHN Paris, Collection Myriapodes JC 292);

— massif et parc national du Djurdjura, crête du Djebel Haiser, novembre 1912, Biospeologica hors série, 2 ♂♂ (MNHN Paris, Collection Myriapodes JC 292);

— Aïn El Hammam, Tala n'Tahalouant, 13.X.1916, Biospeologica 916, 1 ♂ (MNHN Paris, Collection Myriapodes JC 292).

Les localités ci-après (dont certaines se retrouvent ci-dessus) ont fourni des femelles dont on n'est pas certain qu'elles appartiennent bien à *A. kabylianus*. D'après leur taille elles seraient plutôt à classer parmi les *fodili* (voir plus haut, dans l'introduction du § description des espèces) :

— massif et parc national du Djurdjura, à Tala-Guilef, versant nord, alt. 1420 m, pièges en forêt de *Cedrus atlantica*, 17.V.1993, 15 ♀♀ topotypes (Coll. A.-K.);

— massif et parc national du Djurdjura, à Tala-Guilef, versant nord, alt. 1420 m, pièges en pâturage, 17.V.1993, 1 ♀ (MNHN Paris, Collection Myriapodes JC 294); 16.V.1994, 5 ♀♀ (Coll. A.-K.); 16.V.1994, 2 ♀♀ (MNHN Paris, Collection Myriapodes JC 294);

— Aïn El Hammam, Djebel Azerou Tidjer, Ifri (grotte) Maareb, 10.VII.1910, 1 ♀, 4 ♂♂ juv., 3 j., Biospeologica 436A (MNHN Paris, Collection Myriapodes JC 294).

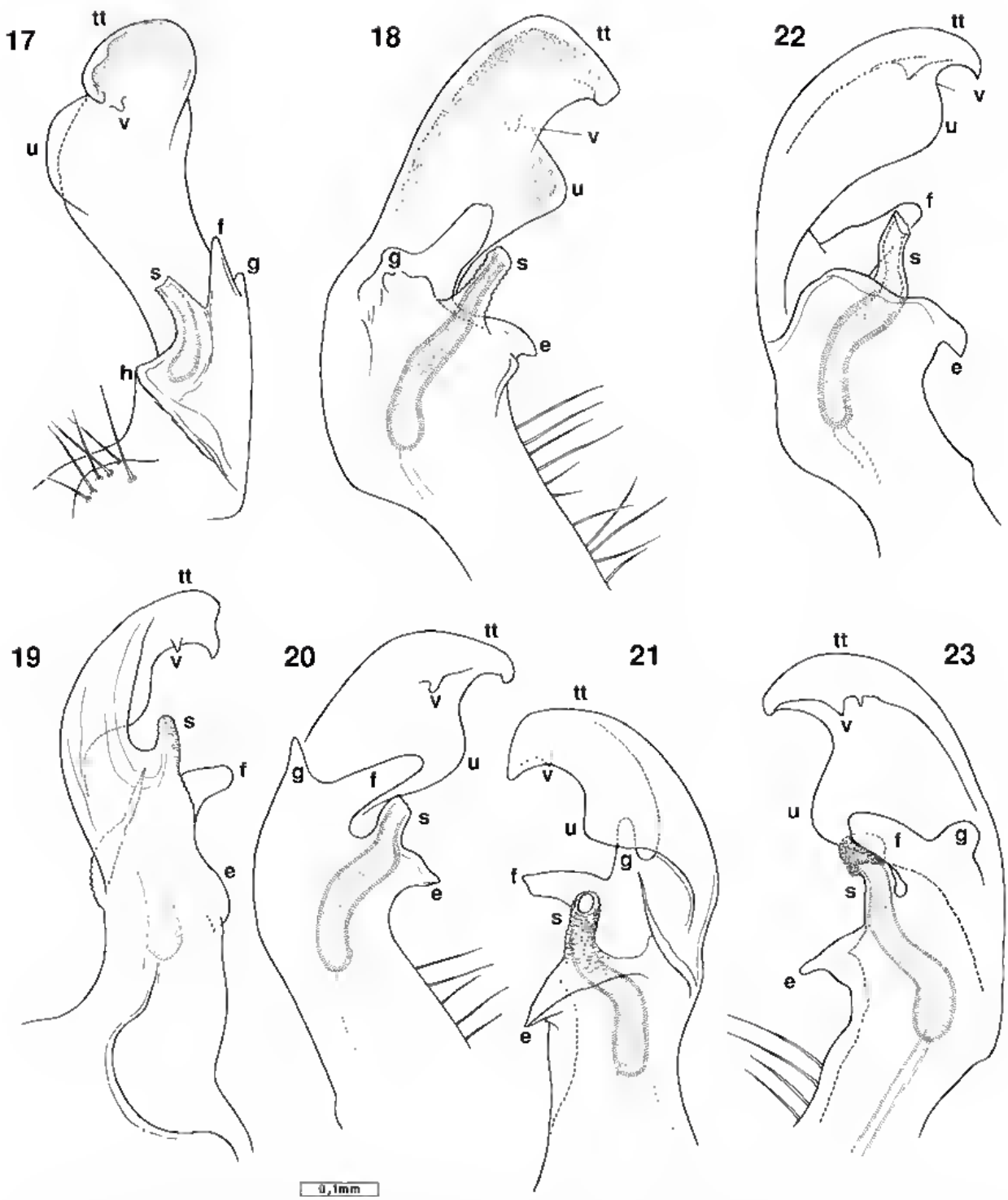
Caractères morphologiques externes

D'aspect très semblable à la précédente, mais plus pigmentée, et possédant des gonopodes assez voisins quoique distincts, cette espèce se signale par sa taille plus grande (c'est la plus grande des trois espèces algériennes), voisine de 15 mm, et par quelques faibles différences de la morphologie externe.

Mensurations (en mm) :

	♂ holotype	♂	♀
Longueur du corps :	14,70	13,2 à 17,9	?
Longueur antenne :	2,20	1,60 à 2,07	?
Largeur du collum :	0,90	–	?
Largeur du T.4 :	1,40	–	?
Largeur max. du T.7 :	1,75	1,52 à 1,65	?

Source : MNHN, Paris



FIGS 17-23. — *Archipolydesmus kabylianus* n.sp. ♂ holotype et autres ♂♂ : 17, télopodite du gonopode droit du ♂ holotype, vue caudale. 18, le même en vue latérale externe. 19, télopodite du ♂ des Tesserefts Tissoukdel, vue médiale. 20, télopodite du gonopode gauche d'un ♂ de la crête du Djebel Heyser, vue médiale. 21, vue latérale externe du même. 22, télopodite du ♂ de Tala n'Tahalouant, vue latérale externe. 23, vue médiale du même.

Source : MNHN, Paris

Les proportions observées sur les antennes sont semblables à celles de *chreensis*.

Au collum, le nombre d'aires polygonales est un peu plus grand : 8 + 8 au premier rang, et respectivement 6 + 6, 5 + 5 et 4 + 4 aux trois autres rangs.

Comme dans l'espèce précédente, le collum (surtout) et le T.3 sont plus étroits que la tête (joues comprises) et le T.2 est légèrement plus large. A partir du T.4, qui a la même largeur que la tête, la largeur des anneaux croît assez rapidement pour atteindre un maximum au T.7.

Sur les anneaux, porifères ou non, les aires polygonales ont la même disposition que chez *chreensis*, et leur nombre est tout aussi variable (5/6 + 5/6). La seule différence tient aux échancrures des parties latéro-caudales, qui sont moins marquées, et au fait que les aires polygonales médiodorsales du rang postérieur sont plus ou moins effacées.

Caractères sexuels du mâle

Gonopodes (Figs 17-23) assez variables se distinguant de ceux de *chreensis* par un port plus robuste, l'atténuation de la dent tibiotarsale distale, la réduction de l'une (g) des deux dents fémorales internes, et la réduction ou l'absence de dent fémorale ventrale (e).

Caractères sexuels de la femelle

Une étude et des prélèvements supplémentaires sont nécessaires pour fixer les caractères de la femelle de *kabylianus* (voir plus haut, l'introduction du § description des espèces).

Archipolydesmus fodili n.sp.

Localité-type. — Algérie, Wilaya de Tizi-Ouzou, massif et parc national du Djurdjura, à Tata-Guitef, versant nord, alt. 1420 m, pièges en forêt de *Cedrus atlantica*, 20.XI.t993, 1 ♂ hototype, 6 ♂♂, 2 ♀♀ paratypes (MNHN Paris, Cottection Myriapodes JC 293), 48 ♂♂, 2 ♀♀ paratypes (Coll. A.-K.).

Topotypes. — t7.V.t993, 6 ♂♂, 5 ♀♀ (MNHN Paris, Collection Myriapodes JC 293), 43 ♂♂, 22 ♀♀ (Cotl. A.-K.); 20.Vt.1993, 4 ♀♀ (Cotl. A.-K.); 18.X.1993, 2 ♂♂ (Cott. A.-K.).

Autres localités. — Algérie, Wilaya de Tizi-Ouzou : massif et parc nationat du Djurdjura, à Tata-Guitef, versant sud, alt. t420 m, pièges en pâturage, t7.V.t993, 3 ♂♂, 2 ♀♀ (Colt. A.-K.) ;

— massif et parc national du Djurdjura, à Tala-Guilef, versant sud, alt. t420 m, pièges en forêt de *Cedrus atlantica*, 17.V.1993, 4 ♂♂ ; 18.Vll.1993, 1 ♂ ; t8.tX.1993, t ♀ ; t8.X.t993, 1 ♀ (Colt. A.-K.) ;

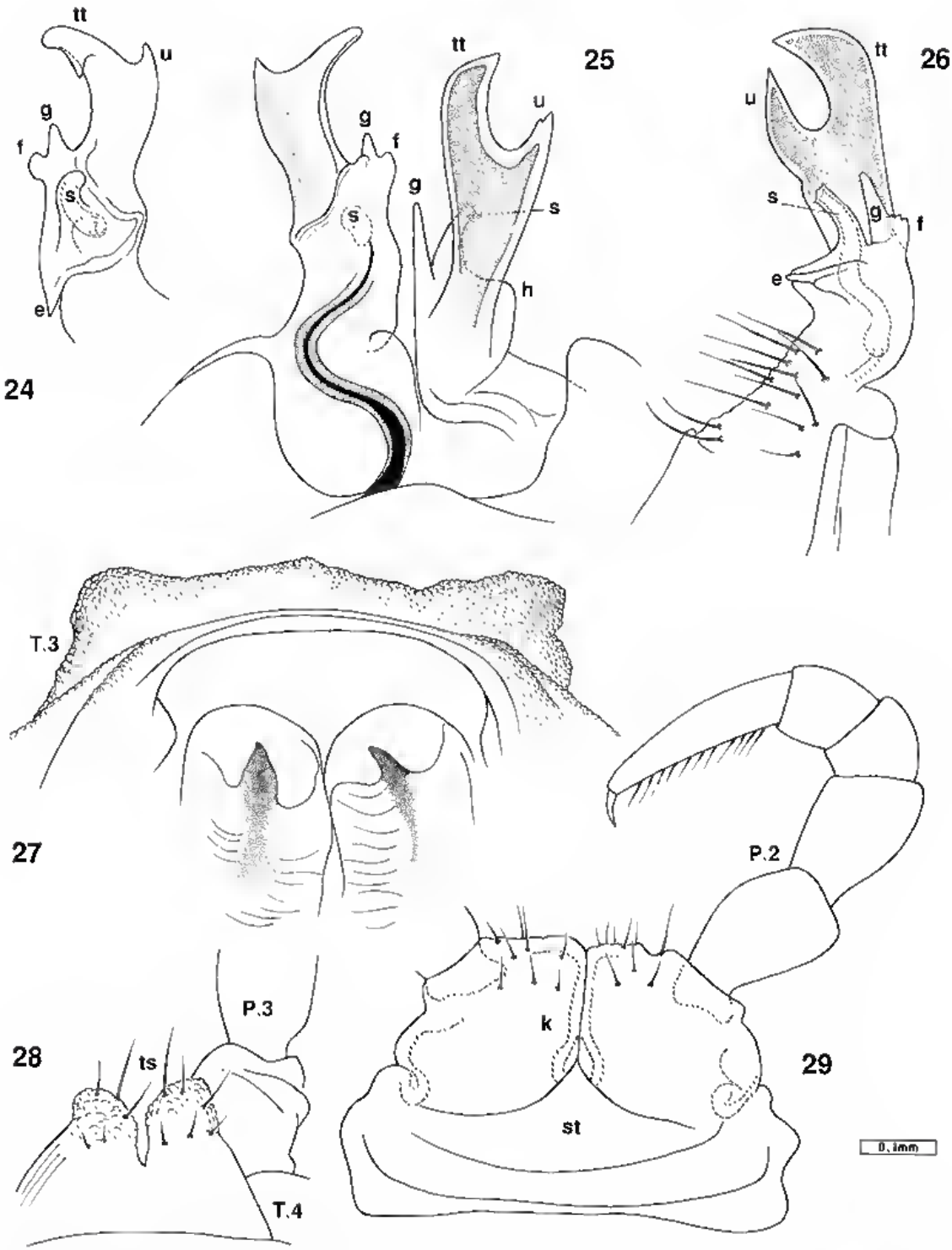
— massif et parc nationat du Djurdjura, à Tala-Guitef, versant nord, alt. 1420 m, pièges en pâturage, 17.V.t993, t ♂, 2 ♀♀ ; 20.Vt.1993, t ♀ ; 20.Xt.1993, 10 ♂♂, 3 ♀♀ ; 16.V.1994, 5 ♂♂, 1t ♀♀ ; 15.VI.1994, 1 ♀ (Cotl. A.-K.).

Étymologie. — Espèce dédiée au conjoint du premier auteur, en remerciement pour son aide très efficace sur te terrain.

Caractères morphologiques externes

D'aspect et de coloration très semblable à la précédente, mais possédant des gonopodes bien distincts, cette espèce ne se distingue extérieurement que par sa taille qui est nettement plus faible, variant autour du centimètre; elle est cependant un peu plus grande que *chreensis*.

Source : MNHN, Paris



FIGS 24-29. — *Archipolydesmus fodili* n.sp. ♂ holotype, ♂♂ paratypes, ♀ paratype : 24, gonopode gauche du ♂ holotype, en vue latérale externe. 25, la paire de gonopodes du ♂ holotype : le droit est en place, en vue orale, tandis que le gauche, déplacé par accident, montre sa face médiale. 26, gonopode droit d'un ♂ topotype, vue caudale. 27, bandeau pleurostemal et partie distale des vulves d'une ♀ paratype, en vue orale. 28, excroissances sternales du quatrième anneau et base des P.3 de la même, en vue orale. 29, P.2 isolées de la même, vue orale

Source : MNHN, Paris

Quelques mensurations (en mm) :

	♂ holotype	♂	♂
Longueur du corps :	9,50	8,70 à 10,30	10,40 à 12,50
Longueur antennes :	1,65	1,60 à 1,84	1,66 à 2,05
Largeur max. du T.7 :	1,20	0,90 à 1,30	1,26 à 1,40

Aux antennes, les proportions sont semblables à celles relevées sur les deux autres espèces.

Au collum, le nombre d'aires polygonales est identique à celui de *kabylianus* : 8 + 8 au premier rang et, respectivement, 6 + 6, 5 + 5 et 4 + 4 aux trois autres rangs.

CARACTÈRES SEXUELS DU MÂLE

Gonopodes (Figs 24-26) construits sur le même modèle que les deux autres espèces algériennes, mais se distinguant nettement par son tibiotarse, qui est ici divisé en deux branches, (tt) et (u), d'épaisseur et de longueur inégales, par une large et profonde échancrure au fond arrondi, située en position distale-externe. La partie fémorale se signale par l'allongement plus important de la dent proximale-ventrale (e) et de l'une des deux dents internes (f), l'autre (g) étant réduite à un vague moignon.

CARACTÈRES SEXUELS DE LA FEMELLE

Le coxostemite des P.2 (Fig. 29) ne se signale que par sa forme un peu plus arrondie que chez *chreensis*.

Le bandeau pleuro-sternal du T.3 ne possède que les deux proéminences lobulaires latérales (Fig. 27).

Les vulves ne se distinguent pas de celles de *chreensis*. C'est pourquoi elles ne sont pas figurées ici. Elles ne se distinguent que par la relative faiblesse du marquage en canelures du cimier ; mais comme ce dernier est non chitinisé, il s'agit certainement de différences liées à un état physiologique ou à un artefact de fixation.

Aux P.3, les deux triangles sternaux (ts) sont plus volumineux, moins aigus que chez *chreensis* et soudés sagittalement jusqu'à mi-hauteur (Fig. 28).

LISTE DES ESPÈCES DE DIPLOPODES CITÉES D'ALGÉRIE

Les citations bibliographiques concernant la présence en Algérie d'un taxon décrit d'un autre pays sont entre {crochets} ; quelques-uns des taxons anciens, dont l'identité reste douteuse, sont entre « guillemets ».

Polyzonida

Hirudisoma remyi Schubart, 1964

Dolistenus savii Fanzago, 1874 {Pocock, 1892}

Source : MNHN, Paris

Craspedosomida

Meinerteuma edoughensis Mauriès, 1982
«*Craspedosoma polydesmoides* Leach, 1814» {Lucas, 1849}

Iulida

Thalassisobates littoralis (Silvestri, 1903) {Brolemann 1925}
Archichoneiulus drahoni (Giard, 1899)
Archichoneiulus brevicornis Brolemann 1921, 1923
Archichoneiulus crebresulcata Brolemann 1921, 1923
Microchoneiulus gracilis Brolemann 1921, 1923
Microchoneiulus baboricola Brolemann 1921, 1923
«*Blaniulus corticalis* Lucas, 1846 & 1849», Brölemann, 1897 (*Microchoneiulus* probable)
Ommatoiulus albosignatus Brolemann, 1931
Ommatoiulus fuscounilineatus (Lucas, 1846, 1849) Pocock, 1892, Brölemann, 1897
Ommatoiulus aumalensis Brolemann, 1925
Ommatoiulus lapidarium (Lucas, 1846, 1849), Brölemann, 1897
Ommatoiulus (diplurum) appendiculatum Brolemann, 1925
Ommatoiulus gauthieri Brolemann, 1931
Afropachyiulus oraniensis (Verhoeff, 1901)
Cylindroiulus truncorum (Silvestri, 1896) {Schubart, 1964}
= *Cylindroiulus africanus* Brölemann, 1897
Cylindroiulus algerinus (Brölemann, 1897)
Cylindroiulus distinctus (Lucas, 1846, 1849) Pocock, 1892, Brölemann, 1897
Cylindroiulus distinctus gauthieri Brolemann, 1931
Brachyiulus lusitanus (Verhoeff, 1898) {Schubart, 1964}

Polydesmida

Oxidus gracilis (C. L. Koch, 1847) {Schubart, 1964}
Oranmorpha guerini (Gervais, 1836)
Oranmorpha guerini atlanticum Brölemann, 1894
«*Strongylosoma pallipes* Olivier, 1792 {Lucas, 1849}»
Stosatea tropifera (Attems, 1903)
Melaphe blainvillei (Eydoux & Gervais, 1838), Lucas, 1849
=? *Melaphe mauritanica* Lucas 1844, 1849
=? *Melaphe mauritanica geniculata* Brölemann, 1910
Haplocookia mauritanica Brölemann, 1915
Polydesmus (Brachydesmus) proximus Latzel, 1889
= *Brachydesmus insculptus* Pocock, 1892
Polydesmus (Brachydesmus) superus Latzel, 1884
Polydesmus dismilus Berlese, 1891 {Brölemann, 1910}
Macellolophus rubromarginatus (Lucas, 1846, 1849)
=? *Macellolophus excavatus* Verhoeff, 1931 {Ceuca, 1988}

Source : MNHN, Paris

Glomerida

Eupeyerimhoffia algerina Brölemann, 1913
Glomeris conspersa C. L. Koch, 1847 = *Gl. marmorata* Brandt, 1840, 1841
Glomeris fuscomarmorata Lucas, 1846, 1849, Pocock, 1892
Glomeris flavomaculata Lucas, 1846, 1849, Pocock, 1892
Glomeris pustulata Latreille, 1804, {Brandt, 1840, 1841}
Glomeris sublimbata Lucas, 1846, 1849, Brölemann, 1913
«*Glomeris pustulata anisosticta* (Brandt, 1840, 1841)»

Polyxenida

Phryssonotus platycephalus (Lucas, 1846, 1849)
Macroxenus rubromarginatus (Lucas, 1846, 1849), Brölemann, 1917
Lophoproctus lucidus Chalande, 1888 {Seurat, 1930}
Polyxenus lagurus (L.) {Marquet & Condé, 1950}
Lophoproctinus inferus maurus Marquet & Condé, 1950

RÉFÉRENCES

ABROUS-KHERBOUCHE O., 1996. — Étude systématique et écologique des myriapodes dans le parc national de Chrea (atlas Blidéen), Algérie. *In* J. J. GEOFFROY, J.-P. MAURIÈS, M. NGUYEN DUY JACQUEMIN (eds), Acta Myriapodologica (9e Int. Congress), *Mém. Mus. natl Hist. nat.* : 163-174.

ATTEMS C., 1898. — System der Polydesmiden. 1. Teil. *Denks. Math.-Naturw. Kaiserl. Akad. Wiss.*, Wien **67** : 221-482.

— 1903. — Beiträge zur Myriopodenkunde. *Zool. Jahrb. Jena* **18** (1) : 63-154.

— 1952. — Myriopoden der Forschungreise Dr. H. Franz in Spanien 1951 nebst ubersicht über die Gesamte iberische Myriopodenfauna. *Eos*, Madrid **28** (4) : 323-366.

BRANDT J. F., 1840. — Rapport sur les Oniscides et les Myriapodes de la régence d'Alger. *Rev. Soc. cuvierienne*, Paris.

— 1841. — Ueber die in Regenschaft Algier beobachteten Myriapoden. *In Wagner's Reisen in der Regenschaft Algier III*. Leipzig.

BRÖLEMANN H. W., 1894. — Contributions à la faune myriapodologique méditerranéenne. *Mém. Soc. Zool. France* : 437-462.

— 1897. — Iulides d'Algérie. *Ann. Sci. Nat., Zool. & Paléont.* : 253-276.

— 1900. — Myriapodes recueillis en Espagne par le P. J. Pantel. *Bull. Soc. Entom. France* **6** : 131-133.

— 1902. — Description d'un nouveau Polydesme d'Espagne. *Bull. Soc. Entom. France* **1** : 13-14.

— 1910. — Symphyles, Pselaphognathes, Polydesmoïdes et Lysiopétalides (Première série). *Arch. Zool. Exp. gén., Biospeologica XVII* **14** (7) : 99-453.

— 1913. — Glomerides, Myriapodes (Première série). *Arch. Zool. Exp. gén., Biospeologica XXXI* **25** (6) : 387-445.

— 1915. — Description d'un genre nouveau et d'une espèce nouvelle de myriapode d'Algérie. *Bull. Soc. Hist. Nat. Afr. Nord*, Alger, juin 1915 **7** (6) : 88-94.

— 1917. — *Macroxenus*, nouveau genre de myriapodes pselaphognathes. *Bull. Soc. Hist. nat. Afr. Nord* **8** : 114-118.

BROLEMANN H. W., 1921. — Liste des myriapodes signalés dans le nord de l'Afrique. *Bull. Soc. Sci. nat. Maroc* **1** (3-6) : 99-110.

Source : MNHN, Paris

— 1923. — Blaniulidae, Myriapodes (Première série). *Arch. Zool. Exp. gén., Biospeologica XLVIII* **61** : 99-453.

— 1925. — Races nouvelles de *Schizophyllum* algériens. *Bull. Soc. Hist. Nat. Afr. Nord*, Alger, nov. 1925 **16** : 245-253.

— 1926. — Myriapodes des Pyrénées-Orientales. *Bull. Soc. Hist. Nat. Toulouse*, 1926 (1927) **54** (2) : 233-267.

— 1931. — Myriapodes recueillis par M. le Dr H. Gauthier en Algérie. *Bull. Soc Hist. Nat. Afr. Nord* **12** : 121-134.

CEUCA T., 1968. — *Archipolydesmus osellai* (Diplopoda, Polydesmidae) une nouvelle espèce montagnarde de l'Espagne. *Mem. Mus. Civ. Stor. Nat. Verona* **68** : 137-140.

— 1988. — Sur quelques diplopodes de la Péninsule ibérique et du nord de l'Afrique. *Stud. Univ. Babes-Bolyai*, Biologia **33** (2) : 40-48.

CONDE B., 1954. — Diplopodes Pénicillates d'Afrique septentrionale. *Bull. Mus Hist. Nat.*, Paris, 2e sér. **26** (4) : 496-500.

EYDOUX F. & GERVAIS P., 1838. — *Myriapodes du voyage autour du monde de la Favorite*, Zool., 2e partie, Paris : 177-180.

GIARD A., 1899. — Sur un myriapode cavernicole du Djurdjura, *Blaniulus Drahoni* n.sp. *Ass. Fr. Avanc. Sci.*, 27e session, Nantes : 170.

HOFFMAN R. L., 1980. — *Classification of Diplopoda*. Muséum d'Histoire Naturelle, Genève, 1979 : 1-238.

LUCAS H., 1846. — Notes sur quelques nouvelles espèces d'insectes (myriapodes) du nord de l'Afrique. *Rev. Zool. Soc. de Cuvier*, Paris **9** : 283-289.

— 1849. — Histoire naturelle des animaux articulés, Tome I. Crustacés, Arachnides, Myriapodes, *In Exploration scientifique de l'Algérie pendant les années 1840-41-42*, Paris.

MARQUET M. L. & CONDÉ B., 1950. — Contribution à la connaissance des diplopodes pénicillates d'Afrique et de la région Madécasse. *Mém. Inst. Sci. Madagascar*, A **4** (1) : 113-134.

MAURIÈS J. P., 1982. — Une famille nouvelle et deux genres nouveaux de Cleidogonoidea, avec notes sur la classification de la superfamille (Diplopoda, Craspedosomida). *Steenstrupia*, Copenhaguen **8** (6) : 165-176.

POCOCK R. I., 1892. — On the Myriapoda and Arachnida collected by Dr Anderson in Algeria and Tunisia. *Proc Zool. Soc. London* 1892 : 24-28.

SCHUBART O., 1953. — Diplopoden aus Marokko gesammelt vom Institut Scientifique Chérifien. *Bull. Soc. Sci. nat. Maroc* **32** : 199-225.

— 1964. — Ueber einige Diplopoden aus Algier. *Bull. Soc. Sci. Nat. & Phys. Maroc* 1963 (1-2) : 79-94.

SEURAT L. G., 1930. — *Exploration zoologique de l'Algérie de 1830 à 1930*. Coll. Centenaire de l'Algérie, Paris (Masson) : 1-708.

VERHOEFF K. W., 1901. — Beiträge zur Kenntniss paläarktischer Myriopoden. XVII. Aufsatz : Diplopoden aus dem Mittelmeergebiet. *Arch. f. Naturgesch.* 1901 **1** (1) : 79-102.

— 1910. — Ueber Diplopoden. 42. Aufsatz : Neue Polydesmiden aus Mitteleuropa und ihre Verwandten. *Zool. Anz. Leipzig* **36** : 132-145.

Source : MNHN, Paris

Source : MNHN, Paris

Bulletin du Muséum national d'Histoire naturelle, Paris, 4e série, 18, 1996
Section A, nos 3-4 ; 589-594

Psalistops gasci n.sp., première Barychelidae de Guyane française (Araneae, Mygalomorphae)

par Patrick MARÉCHAL

Résumé. — *Psalistops gasci*, de la famille des Barychelidae, est une nouvelle espèce décrite de Guyane française. C'est la première fois qu'un mygalomorphe de cette famille est trouvé dans cette partie de la région néotropicale. Cette espèce vit au niveau du sol des forêts humides.

Mots-clés. — Araneae, Mygalomorphae, Barychelidae, Guyane française, nouvelle espèce.

***Psalistops gasci* n.sp., first Barychelidae from French Guiana (Araneae, Mygalomorphae).**

Abstract. — One species of Barychelidae, *Psalistops gasci*, is described from French Guiana. This is the first record of this mygalomorph family from this neotropical country. The species is a ground dweller occurring in wet tropical forests.

Key-words. — Araneae, Mygalomorphae, Barychelidae, French Guiana, new species.

P. MARÉCHAL, *Muséum national d'Histoire naturelle, Laboratoire de Zoologie (Arthropodes), 61 rue de Buffon, 75231 Paris cedex 05*

INTRODUCTION

La Guyane française est une région relativement peu explorée du point de vue des études arachnologiques. Si l'on excepte les travaux de LOURENÇO (1983, 1991) sur les scorpions, les autres ordres d'arachnides sont peu ou pas connus. Ainsi, le dernier travail d'importance sur les araignées, publié par CAPORIACCO (1954) ne recense-t-il que 357 espèces pour ce département dont quatorze mygalomorphes répartis en trois familles : les Idiopidae, les Dipluridae et les Theraphosidae.

La description d'une nouvelle Barychelidae porte donc à quatre le nombre de familles de mygales présentes en Guyane française.

LES BARYCHELIDAE AMÉRICAINES

Les Barychelidae du continent américain comprennent neuf genres (RAVEN 1994). Leur aire de répartition englobe l'Amérique du Sud, les Caraïbes et une partie de l'Amérique centrale, le Costa Rica constituant la limite nord de leur distribution (VALERIO 1986). La présence de cette

Source : MNHN, Paris

famille n'a donc rien d'exceptionnel en Guyane française, où vivent certainement plusieurs autres espèces.

LE GENRE *Psalistops*

Créé par SIMON (1889), il a été initialement caractérisé par la position relative des yeux les uns par rapport aux autres, critère trop vague pour des mygalomorphes. Redéfini par RAVEN (1985), les araignées du genre *Psalistops* se caractérisent par la présence d'une seule rangée de dents sur les griffes tarsales paires, une aire oculaire deux fois plus large que longue, des tarses IV sans scopula et un labium portant plus de dix denticules apicaux. Le genre *Psalistops* comprend actuellement douze espèces présentes dans les Caraïbes, la moitié sud de l'Amérique centrale et le nord de l'Amérique du Sud.

Psalistops gasci n.sp.

MATÉRIEL EXAMINÉ. — Holotype ♀, rivière Arataye, Saut Pararé (4°05'N – 52°40'W). Capturée le 18 février 1990 (P. Maréchal). Paratype ♀, Montagne de Kaw (4°40'N – 52°15'W). Capturée en juin 1993 (C. Marty). L'holotype et le paratype sont déposés au Muséum national d'Histoire naturelle de Paris.

ÉTYMOLOGIE. — Cette espèce est dédiée au Prof. J.-P. GASC grâce auquel j'ai pu prospecter le territoire guyanais à deux reprises dans le cadre de l'action spécifique « Guyane » du Muséum national d'Histoire naturelle.

DIAGNOSE

Psalistops gasci diffère de toutes les autres espèces du genre par la présence de longs poils orangés disposés sur toute la surface des tibias et des métatarses III et IV, donnant à ces pattes l'aspect d'écouvillons.

L'espèce diffère de *P. melanopygius* Simon, 1889 par des scopulas entières sur les tarses I et II, et par l'article apical digitiforme des filières latérales postérieures.

DESCRIPTION

Holotype ♀

Longueur totale sans les chélicères, 25 mm.

Couleur. Céphalothorax brun s'éclaircissant vers l'avant de la partie céphalique. Chélicères, pattes, sternum et pièce labiale, marron clair, presque orange. Abdomen noir sur la face dorsale avec de long poils blanchâtres, beige sur les côtés et sur la face ventrale.

Carapace. Longueur 9,5 mm; largeur 8,25 mm. Recouverte d'une pubescence blanchâtre et clairsemée, plus dense et composée de poils plus longs sur les bords et vers la fovéa.

Fovéa. Profonde et nettement procurvée.

Yeux. (Fig. 1b) Tubercule distinct. Aire oculaire occupant un quart de la partie céphalique en largeur. Yeux disposés en un rectangle compact, largeur 1,6 mm; longueur 1,15 mm. Yeux antérieurs en ligne procurvée, les médians contigus; yeux postérieurs en ligne récurvée.

Chélicères. Glabres à leur base, mais recouvertes d'une pubescence blanchâtre dense sur le dessus, plus clairsemée sur les côtés. Elles possèdent, en position dorso-interne, des soies

Source : MNHN, Paris

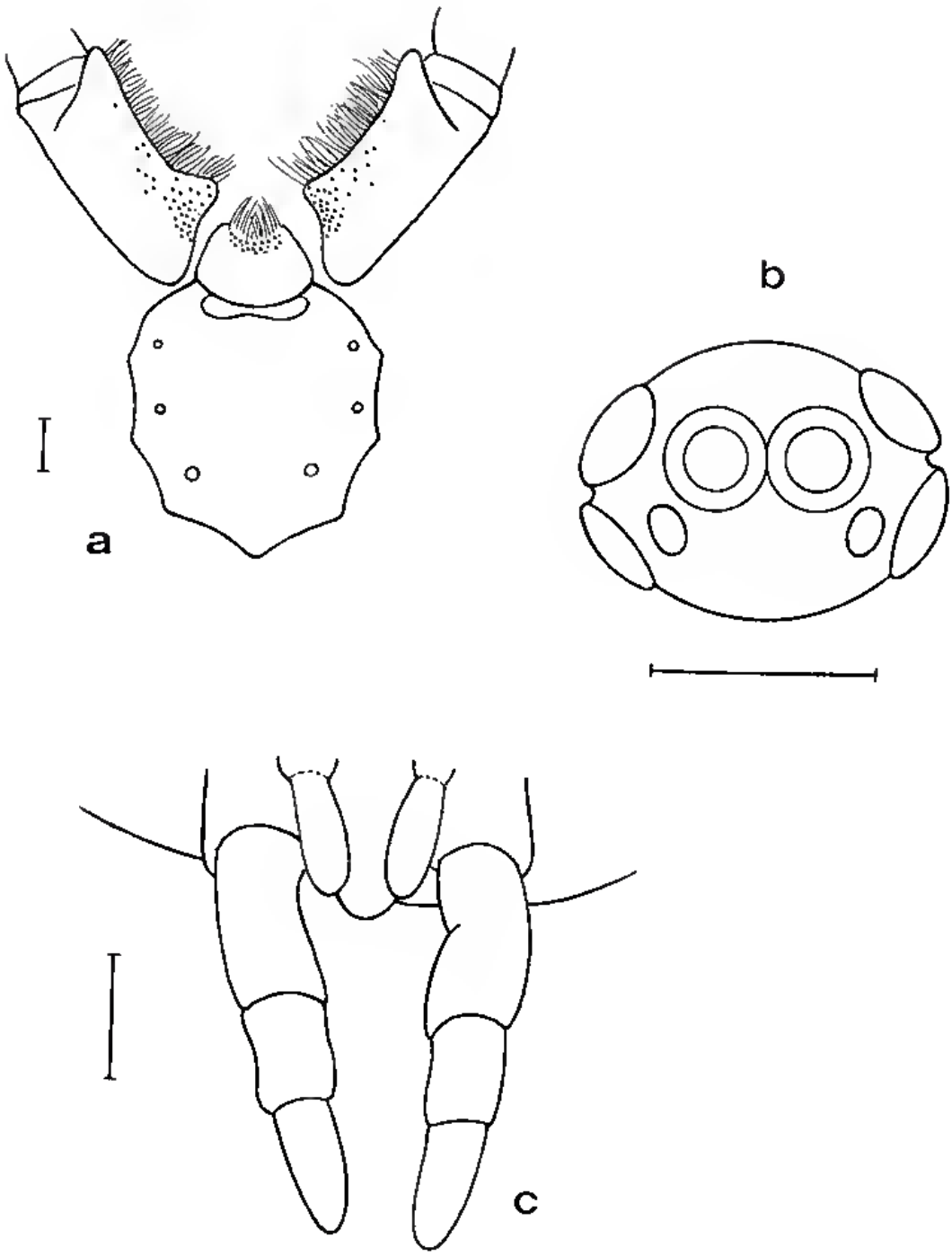


FIG. 1. — *Psalistops gasci* n.sp., holotype ♀. a, sternum, lames maxillaires et labium, vue ventrale. b, aire oculaire, vue dorsale. c, filières, vue ventrale. Échelle : 1 mm.

Source : MNHN, Paris

noires à la base s'éclaircissant progressivement, en disposition plus dense sur la partie antérieure de l'article basal. Marge interne munie de dix à douze dents coniques. Sillon ventral pourvu à la base d'une plage comprenant une quinzaine de denticules. Pas de rastellum.

Labium. (Fig. 1a) De forme trapézoïdale. Longueur 1,6 mm; largeur à la base 2,3 mm. Muni de trente-cinq à quarante denticules apicaux. Suture labio-sternale composée de deux dépressions communicantes.

Lames maxillaires. (Fig. 1a) Longueur antérieure 3,15 mm; longueur postérieure 3,95 mm; largeur 2,2 mm. Pourvues de cinquante à soixante denticules dans leur angle interne.

Sternum. (Fig. 1a) Longueur 4,7 mm; largeur 4,4 mm. Sigilles ronds, les postérieurs les plus gros, les deux paires antérieures peu distinctes.

Pédipalpe. Muni d'une griffe tarsale mutique, en partie cachée par des fascicules unguéaux denses et irisés. Scopula peu dense et localisée sur les deux tiers apicaux des tarses.

Pattes. Griffes paires munies d'une rangée médiane de cinq à six dents. Fascicules unguéaux moins denses sur les tarses III et IV. Scopula entière sur les tarses et la moitié apicale des métatarses I et II, largement coupée par une bande médiane de longues soies noires sur les tarses III, absente sur les tarses IV. Tibias et métatarses III et IV portant, sur toute leur surface, de longs poils orangés donnant à chacune de ces pattes l'aspect d'un écouvillon (Fig. 2).

Mensurations (mm)	I	II	III	IV	Pd
Fémur	6,5	6	6	7,5	5
Patelle	4,5	4,5	3,25	4	3,25
Tibia	5,5	5	3,75	5,5	3,75
Métatarse	3,25	3,25	5,5	7,5	—
Tarse	2,75	2,5	3	3	3
Total	22,5	21,25	21,5	27,5	15

Épines. Pédipalpe. Tibia, face ventrale : deux apicales et une prolatérale.

Patte I. Métatarse, face ventrale : une apicale et une médiane.

Patte II. Métatarse, face ventrale : trois apicales et deux médianes. Tibia, face ventrale : une apicale et une médiane; face dorsale : une prolatérale au tiers antérieur du segment.

Patte III. Métatarse, face ventrale : trois apicales, deux médianes et trois prolatérales; face dorsale : trois prolatérales et deux rétrolatérales. Tibia, face ventrale : deux apicales, une médiane et une prolatérale; face dorsale : deux prolatérales et deux rétrolatérales.

Patte IV. Métatarse, face ventrale : trois apicales, deux médianes et deux prolatérales; face dorsale : trois prolatérales et trois rétrolatérales. Tibia, face ventrale : deux apicales, une médiane et une prolatérale; face dorsale : deux prolatérales et deux rétrolatérales.

Filières. (Fig. 1c) Longueur des postérieures médianes 0,98 mm. Longueur des postérieures latérales 5 mm; article basal 2 mm; article médian 1,4 mm; article apical 1,6 mm. L'article apical est digitiforme.

Source : MNHN, Paris

Paratype ♀

Plus grande, cette femelle est certainement plus âgée et possède au moins un stade de développement supplémentaire.

Longueur totale sans les chélicères 29 mm. Carapace, longueur 11 mm; largeur 9,5 mm. Longueur de l'abdomen 18 mm.

Deux caractères diffèrent légèrement par rapport à l'holotype. La marge interne des chélicères porte douze à treize dents et les denticules apicaux du labium sont un peu plus nombreux. Ces valeurs évoluant au cours des stades de développement chez *Acanthogonatus francki* (Nemesiidae) (CALDERON com. pers.), les écarts constatés sont vraisemblablement dûs à la différence d'âge des deux individus.

L'observation du nombre des épines montre également de très légères différences; l'épine prolatérale sur la face ventrale du tibia manque sur les deux pédipalpes. La face ventrale du tibia III porte, dans sa partie basale, une épine surnuméraire fine et effilée. Le tibia IV possède trois épines apicales sur sa face ventrale. Le nombre et la répartition des autres épines sont strictement identiques à ceux observés sur l'holotype.

Les deux individus sont en tout point semblables pour l'ensemble des autres caractères.

Le mâle est inconnu.

HABITAT

L'holotype a été trouvé sous une branche tombée au sol à quelques mètres de la rivière Arataye, au niveau du saut Pararé. Aucune construction, tissage ou terrier, n'a été observée. Juvénile, l'individu a été élevé au laboratoire où il a subi trois mues avant d'atteindre l'âge adulte en novembre 1990. Cette femelle est morte un mois plus tard.

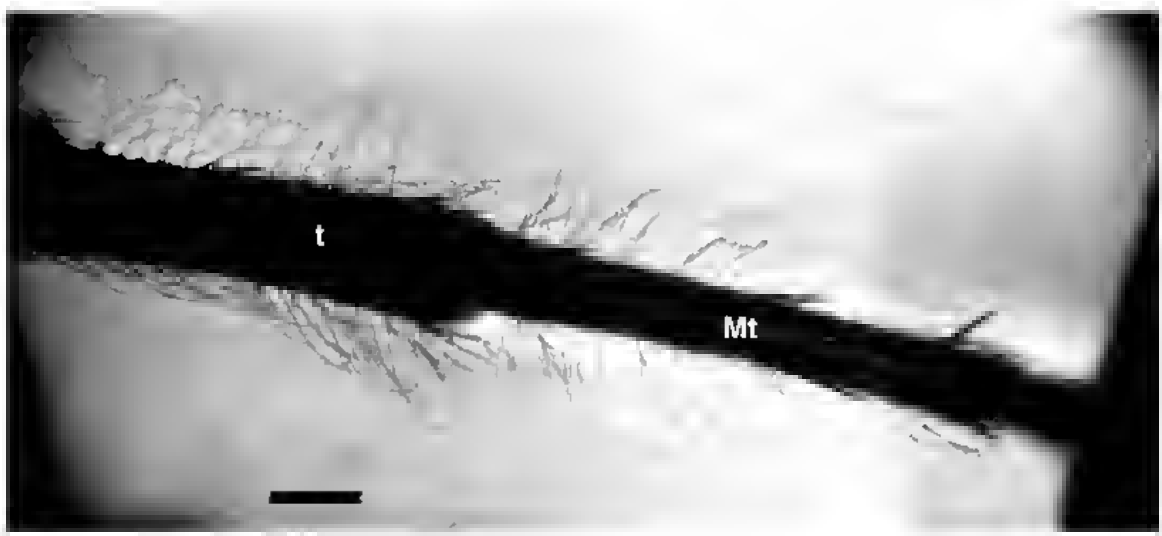


FIG. 2. — *Psalistops gasci* n.sp., vue dorsale de la patte droite; métatarse (Mt) et tibia (t) III. Échelle : 1 mm. (Cliché Dr J. KOVOOR).

Source : MNHN, Paris

Le paratype a été collecté dans la montagne de Kaw et maintenu quelque temps en captivité. La biologie de cette espèce reste inconnue. Cependant, les observations d'élevage et de collecte laissent supposer la confection d'une loge soyeuse au niveau du sol en utilisant des abris ou anfractuosités naturels, car ces deux individus ont rempli leur enceinte d'élevage d'un abondant tissage. *Psalistops gasci* ne semble pas creuser de terrier, hypothèse appuyée par l'absence de rastellum, structure généralement présente chez les espèces fouisseuses de cette famille.

Remerciements

Mes plus vifs remerciements au Dr R. J. RAVEN pour sa patience, sa disponibilité et ses nombreux conseils relatifs à la systématique des araignées mygalomorphes.

RÉFÉRENCES

CAPORIACCO L. DI, 1954. — Araignées de la Guyane française du Muséum national d'Histoire naturelle de Paris. *Commentat. pontif. Acad. scient.* **16** (3) : 45-193.

LOURENÇO W. R., 1983. — La faune des scorpions de Guyane française. *Bull. Mus. natl Hist. nat.*, Paris, sér. 4, A **5** (3) : 771-808.

— 1991. — La « province » biogéographique guyanaise ; étude de la biodiversité et des centres d'endémismes en vue de la conservation des patrimoines génétiques. *C. R. Soc. Biogéogr.* **67** (2) : 113-131.

RAVEN R. J., 1985. — The spider infraorder Mygalomorphae (Araneae): Cladistics and systematics. *Bull. Am. Mus. nat. Hist.* **182** : 1-180.

— 1994. — Mygalomorph spiders of the Barychelidae in Australia and the Western Pacific. *Mem. Qld. Mus.* **35** (2): 291-706.

SIMON E., 1889. — Voyage de M. E. Simon au Vénézuela (Décembre 1887-Avril 1888). 4e mémoire. *Ann. Soc. ent. Fr.* **9** (6) : 169–220.

VALERIO C. E., 1986. — Mygalomorph spiders in the Barychelidae (Araneae) from Costa Rica. *J. Arachnol.* **14**: 93-99.

Source : MNHN, Paris

Bulletin du Muséum national d'Histoire naturelle, Paris, 4e série, **18**, 1996
Section A, nos 3-4 : 595-609

Liste des types d'oiseaux des collections du Muséum national d'Histoire naturelle de Paris. 4. Hérons (Ardeidae)

par Claire VOISIN & Jean-François VOISIN

Résumé. — Les types de dix-huit taxons de Hérons (*Ardeidae*) sont passés en revue de façon critique. Des lectotypes et des paralectotypes sont désignés pour *Ardea novae-hollandiae* Vieillot, 1817 et pour *Ardea australasie* Vieillot, 1823 (les deux descriptions sont fondées sur les mêmes spécimens), ainsi que pour *Ardea bilineata* Cuvier *in* Lesson 1831. Quatre spécimens supplémentaires, portant la mention « type » mais qui n'en sont pas au sens du Code, ont aussi été examinés.

Mots-clés. — Oiseaux, types, Ardéidés.

List of the types of birds in the collections of the Muséum national d'Histoire naturelle of Paris. 4. Herons (Ardeidae).

Abstract. — The types of eighteen heron (*Ardeidae*) taxa are reviewed critically. Lectotypes and paralectotypes are designated for *Ardea novae-hollandiae* Vieillot, 1817, *Ardea australasie* Vieillot, 1823 (both descriptions are based on the same specimens), and for *Ardea bilineata* Cuvier *in* Lesson, 1831. Four additional specimens, indicated as « types », but which are not according to the meaning of type in the Code of Zoological Nomenclature, were also examined.

Key-words. — Birds, types, Ardeidae.

C. VOISIN & J.-F. VOISIN, *Muséum national d'Histoire naturelle, Laboratoire de Zoologie, Mammifères et Oiseaux, 55 rue de Buffon, F-75231 Paris cedex 05*

CATALOGUE

Ce travail fait suite à trois articles précédents concernant les types d'oiseaux du Muséum national d'Histoire naturelle (J.-F. VOISIN 1992, 1995; C. VOISIN 1993) et suit les mêmes conventions.

Pour chaque spécimen nous avons noté successivement :

– le nom sous lequel il a été décrit;
– la référence de la description;
– la catégorie de type à laquelle il appartient;
– le numéro d'inscription au Catalogue Général;
– le nom qu'il porte dans la nomenclature actuelle. Nous avons en général suivi HANCOCK & ELLIOTT (1978).

Les mentions qui se trouvent sous le socle ont toutes été recopiées en commençant, dans la mesure où il est possible de les identifier, par les plus anciennes. Elles s'échelonnent pour

Source : MNHN, Paris

certaines de la fin du XVIII[e] siècle à nos jours. Les mentions portées sur les étiquettes des socles ont également été recopiées. Les retours à la ligne sont indiqués par le symbole /. Nous en avons respecté l'orthographe.

REMARQUES

Les numéros de catalogue compris entre 1 à 15566 et non précédés de la mention N. C. (Nouveau Catalogue) correspondent à l'ancien catalogue établi au XIX[e] siècle. Les numéros précédés de la mention N. C. correspondent au catalogue des oiseaux montés de la Grande Galerie, établi durant la première moitié du XX[e] siècle par le Professeur J. BERLIOZ. Les numéros précédés de la mention C. G. et d'un millésime correspondent au Catalogue Général actuellement en vigueur. Tous ces documents sont conservés au laboratoire des Mammifères et Oiseaux.

Les socles de quelques spécimens portent la mention « Type de Buffon » ou bien « type de la planche de Buffon. » Bien qu'ils aient servi à BUFFON pour ses descriptions et pour l'illustration de son *Histoire Naturelle des Oiseaux* dont la première édition date de 1771-1786, ils ne sauraient être considérés comme des types au sens du *Code de Nomenclature Zoologique* (1985) car BUFFON n'employait pas la nomenclature binominale de LINNÉ.

TYPES DE TAXONS DONT LA DÉNOMINATION EST ENCORE EN VIGUEUR

Ardea heliosylus Lesson, 1828

Lesson, *in* DUPERREY (ed.) *Voyage de la Coquille 1822-1825*; LESSON & GARNOT *Zool.* 1 : 722, *Atlas, Zool. Oiseaux* planche 44.

Type par monotypie.

C. G. 1995 – 236.

Zonerodius heliosylus (Lesson, 1828).

Inscriptions sous le socle :

Botaurus heliosylus / (Less.) / Lesson et Garnot / N.Guinée / Exped. Duperrey / Type de l'espèce / [écriture ancienne] Butor tigré n. Guinée / Zonerodius heliosylus / (Less.) / (Type) / La Coquille – N. Guinée / N. C. 158 [écriture plus récente]

Inscriptions sur l'étiquette :

Butor tigré de N. Guinée / Zonerodius heliosylus / (Less.) / (Type) / La Coquille N. Guinée.

Remarques : la description de LESSON, précise et détaillée, comprend une page entière dans le livre et une planche en couleur du spécimen dans l'atlas. L'oiseau a été tiré par M. Roland « sur les rivages du hâvre de Doréry, Nouvelle Guinée ». LESSON a fait partie de l'expédition Duperrey sur la corvette *la Coquille*. L'auteur de la description est donc également le collecteur.

Buphus bacchus Bonaparte, 1855

Bonaparte, *Consp. Gen. Avium* : 127.

Type par monotypie.

Source : MNHN, Paris

C. G. 239 – 239.
Ardeola bacchus (Bonaparte, 1855).
Inscriptions sous le socle :
Ardea bacchus. (Bp.) / (Type) / Calcutta / par M Barbe / juillet 1840 / [écriture ancienne] / 13948 B [écrit au crayon] N. C. n° 100 / Crabier de Chine / Ardeola r. bacchus / (Bp.) / type / M. Barbe / Calcutta / [écriture plus récente].
Inscriptions sur l'étiquette :
Crabier de Chine / Ardeola r. bacchus / (Bp.) / Type / M. Barbe / Calcutta.

Remarque : dans sa diagnose BONAPARTE précise que le spécimen décrit a bien été rapporté par M. Barbe.

Ardea leuconotus Wagler, 1827
Wagler, *Systema Avium*, *Ardea* : 189 sp. 33.
Type par monotypie.
C. G. 1995 – 245.
Gorsachius leuconotus (Wagler, 1827).
Inscriptions sous le socle :
Ardea leuconotos, Wag. type de / Wagler. / Ardea leuconotos. (Tem) / Bihoreau à dos blanc / [écriture ancienne] Sénégal par Watrin. 1817 / N. C. 124 Nycticorax leuconotus / (Wag.) Type / 14013 Bihoreau à dos blanc [mention au crayon] Bihoreau à dos blanc / Nycticorax leuconotus (Wagl.) / M. Watrin. Sénégal [écriture récente].
Inscriptions sur l'étiquette :
Bihoreau à dos blanc / Nycticorax leuconotus / (Wagl.) Type / M.Watrin Sénégal.

Remarques : WAGLER a séjourné à Paris en 1825 lors de la rédaction de son livre *Systema Avium* (STRESEMANN 1951). Dans sa description, l'auteur précise que le type se trouve au Muséum de Paris et provient de Sénégambie. La référence à TEMMINCK sous le socle sans la mention « type » et sans renvoi à une planche coloriée ou à une description montre que ce spécimen n'est pas un type de TEMMINCK.

Nycticorax goisagi Temminck, 1835
Temminck, *Planches coloriées*, Livre 98. Description et planches en couleurs, planche 582.
Type par monotypie.
C. G. 1995 – 241.
Gorsachius goisagi (Temminck, 1835).
Inscriptions sous le socle :
Botaurus melanolophus / (Raffl.) / Gorsakius typus / Puch. type. / échangé à Temminck / 1836 [écriture ancienne] / 14006 / décrit Consp. Av. II p.138 / V.pl. Col. 582 / [écriture ancienne] / N. C. n° 148 / Petit butor de Malaisie / Gorsachius goisagi / (Temm) / Japon : [écriture plus récente].
Inscriptions sur l'étiquette :
Petit Butor du Japon / Gorsachius goisagi / (Temm.) / Japon.

Source : MNHN, Paris

Remarques : c'est ce spécimen qui a servi de modèle à la planche coloriée de TEMMINCK lors de la figuration de l'espèce. Il fut désigné comme « type de la planche » dès cette époque, d'où les mentions sous le socle : « V. Pl. Col. 582 » et « échangé à Temminck ».

Par la suite BONAPARTE (1857) s'est mépris sur l'identité de *Gorsachius melanolophus* (Raffles) qu'il considère comme l'adulte de *Gorsachius goisagi* (Temm.), alors qu'il en voit la forme juvénile dans *Gorsachius goisagi* lui même (voir également la partie : espèces considérées à tort comme types). Ainsi lorsque BONAPARTE crée le genre *Gorsachius*, il ne cite que l'espèce *goisagi*. La confusion qu'il fait avec *Gorsachius melanolophus* n'empêche pas de considérer *Gorsachius goisagi* comme espèce-type du genre *Gorsachius* car, bien qu'il ait cru avoir affaire à un individu juvénile, BONAPARTE a correctement identifié ce taxon. PUCHERAN ne semble jamais avoir décrit le genre *Gorsachius*, qu'il faut donc attribuer à BONAPARTE.

Ardea cinerea monicae Jouanin & Roux, 1963.
Jouanin & Roux, *Oiseaux et Rev. fr. Orn.* **33** : 103-106.

Premier spécimen, holotype par désignation originale.
C. G. 1961 – 4.
Ardea cinerea monicae Jouanin & Roux, 1963.
Étiquette rouge :
Ardea cinerea monicae / Jouanin et Roux 1963 / C. G. 1961 n° 4 / Ardea cinerea monicae Jouanin et Roux 1963 / O.R.F.O. 33 : 104.
Étiquette blanche :
Ardea cinerea monicae / Jouanin et Roux / Loc. : île Arel, banc d'Arguin, 20 juin 1960 / adulte nicheur / Type / Coll. : Mr. J. Dragesco / Loc. : Mauritanie / C. G. 1961 n° 4.

Remarque : ce spécimen désigné comme « type » dans la description est en fait l'holotype par désignation originale (Code international de Nomenclature Zoologique, 3e éd., 1985, article 73 A I).

Second spécimen, paratype par désignation originale implicite
C. G. : 1961-770.
Ardea cinerea monicae Jouanin & roux, 1963.
Étiquette rouge :
Ardea cinerea monicae / Jouanin et Roux / C. G. 1961 n° 770 / paratype.
Étiquette blanche :
Col. Mr. Dragesco / Loc. Mauritanie / C. G. 1961 n° 770 / Ardea cinerea monicae / Jouanin et Roux / Loc. île Kiaone-ouest / Banc d'Arguin / juin 1960 / adulte nicheur.

Remarque : ce second spécimen, mentionné mais non désigné dans la publication originale, a lui aussi servi à établir la description de l'espèce et constitue donc un paratype (Code international de Nomenclature Zoologique, 3e éd., 1985, article 72 B V).

Ardea purpurea bournei de Naurois, 1966.
de Naurois, *L'Oiseau et Rev. fr. Orn.* **36** : 89.

Source : MNHN, Paris

Premier spécimen, holotype par désignation originale.
C. G. 1966-891.
Ardea purpurea bournei de Naurois, 1966
Étiquette rouge :
Ardea purpurea bournei / de Naurois 1966 / C. G. 1966 n° 891 / Ardea purpurea / bournei de Naurois 1966 / ORFO 36 : 89.
Étiquette blanche :
Coll. Abbé R. de Naurois / Loc. Ile du Cap Vert / C.G.1966-891/ Ardea purpurea bournei Naurois / Loc. Ilha de Santiago / Type / 1964.

Second spécimen, paratype par désignation originale.
C. G. 1966-892.
Ardea purpurea bournei de Naurois, 1966.
Étiquette rouge :
Ardea purpurea / bournei Naurois / C. G. 1966 n° 892 / paratype / Ardea purpurea bournei / O.R.F.O. 1966 / 36 : 89.
Étiquette blanche :
Coll. Abbé R. de Naurois. / Loc. Archipel du Cap Vert / C. G. 1966 n° 892 / Ardea purpurea bournei / Naurois / Loc. Ile de Santiago / 31.X. 1965. Femelle.

Troisième spécimen, paratype par désignation originale.
C. G. 1966-895.
Ardea purpurea bournei de Naurois, 1966.
Étiquette rouge :
Ardea purpurea bournei Naurois / C. G. 1966 n° 895 / Paratype / Ardea purpurea bournei Naurois / O.R.F.O. 1966 36 : 89.
Étiquette blanche :
Coll. Abbé R. de Naurois / Loc. Iles du Cap Vert / C. G. 1966 n° 895 / Ardea purpurea bournei / Naurois / Loc. Ilha de Santiago / 1964 Sexe ?

Quatrième spécimen, paratype par désignation originale
C. G. 1966-897.
Ardea purpurea bournei de Naurois, 1966.
Étiquette rouge :
Ardea purpurea bournei Naurois / C. G. 1966 n° 897 / Paratype / Ardea purpurea bournei Naurois / O.R.F.O. / 1966 36 : 89.
Étiquette blanche :
Col. Abbé R. de Naurois / Loc. Iles du Cap Vert : C. G. 1966 n° 89 / Ardea purpurea bournei : Naurois / Loc. île Santiago / 1964 sexe ?

Remarque : la sous-espèce *Ardea purpurea bournei* de Naurois est incontestablement valable. Immédiatement identifiable, elle diffère largement autant de la sous-espèce nominale que ne le fait la sous-espèce asiatique *Ardea purpurea malinensis* Meyen.

Source : MNHN, Paris

Ardeola podiceps Bonaparte, 1855.
Bonaparte, *Consp. Gen. Avium*, tome 2 : 134.
Type par monotypie.
C. G. 1995 – 250.
Ixobrychus minutus podiceps (Bonaparte, 1855).
Inscriptions sous le socle :
13982 Ardeola podiceps, Bp.type / de Madagascar / 1894 / par M. Bernier / [écriture pâle] N. C. N° 214 Blongios nain. / Ixobrychus m. podiceps / Type (Bp.) / M. Bemier. Madagascar [écriture plus récente, très nette].

Remarque : dans sa diagnose BONAPARTE précise que l'exemplaire décrit provient de Madagascar et qu'il a été rapporté par Monsieur Bernier.

Cancroma coromanda Boddaert, 1783.
Boddaert, *Table Planches Enlum.* : 5.
Type par monotypie.
C. G. 1995 – 233.
Bubulcus ibis coromanda (Boddaert, 1783).
Inscriptions sous le socle :
heron a [sic] cou jaune rapporté par Sonnerat en 1770 / Duf. Enl 910 / aigrette dorée [écriture très ancienne] monté en 1807 [autre écriture très ancienne] / ardea comata B, Gm. / ardea russata, Tem. / de la côte de / coromandel / par Sonnerat. enl. 910 / selon toute probabilité / le type de la planche / de Buffon / N° 48 / 6-5 [toutes ces mentions, bien qu'anciennes sont encore bien lisibles] Bubulcus coromandus (Bodd) [cette dernière mention est récente et écrite au crayon].
Inscriptions sur l'étiquette :
Bubulcus coromandus / (Bodd.) / Type / Sonnerat Coromandel

Remarques : BODDAERT a décrit *Cancroma coromanda* d'après BUFFON 1780 *Hist. Nat. Oiseaux* 7 : 393 et *Le Crabier de la côte de Coromandel* de DAUBENTON 1765-1781, planche enl. n° 910. D'après l'inscription sous le socle ce spécimen est celui représenté par DAUBENTON. Considéré comme « type de Buffon » il est aussi celui de l'espèce, d'après le Code international de Nomenclature de Zoologie, 3e éd., 1985, article 72 c 5 : « dans le cas d'un taxon nominal du groupe-espèce fondé sur l'illustration ou une description, ou une référence bibliographique à une illustration ou à une description, le spécimen illustré ou décrit et non l'illustration ou la description » constitue un Type porte-nom acceptable.

Ardea agami Gmelin, 1789.
Gmelin, *Systema Naturae, Aves* : 629.
Type par monotypie.
C. G. n° 1995 – 246.
Agamia agami (Gmelin, 1789).

Source : MNHN, Paris

Inscriptions sous le socle :
Remis les plateaux à réparé [sic] en 1849 / Le plateau portait pour renseignement / Cayenne, par Martin / l'Etiquette, l'amerique / [mot illisible]. Je crois que c'est le type [mot illisible] / la pl. enl. 859 de Buffon. / 1349-D / [écriture ancienne]. Ardea agami / (Gm) / Type de / Buffon / N. C. n° 213 / [écriture récente].
Inscriptions sur l'étiquette :
Ardea agami / (Gm). Type de Buffon / Cayenne?

Remarques : GMELIN a décrit *Ardea agami* d'après le texte de BUFFON : *Hist. Nat. Oiseaux* 7 : 382 et la planche enlum. pl. 859 «Le Héron Agami de Cayenne» dessinée par DAUBENTON 1765-1781. D'après l'inscription sous le socle ce spécimen est bien celui représenté par DAUBENTON. Considéré comme «type de Buffon» il est aussi le type de l'espèce d'après le Code international de Nomenclature Zoologique, 3e éd. (1985) article 72 c 5 (voir ci-dessus).

TYPES DE TAXONS TOMBÉS EN SYNONYMIE

Ardea atricollis Wagler, 1827.
Wagler, *Systema Avium*, Ardea : 174 sp. 4.
Type par monotypie.
C. G. 1995 – 238.
Ardea melanocephala Vigors & Children, 1826.
Inscriptions sous le socle :
Ardea atricollis Wagl. / du Sénégal / Ech. à m. Fl. Prévost 1[illisible]27 Type de / Wagler / 13864 / 388 Manuel / Degland [écriture ancienne; les trois dernières mentions sont inscrites au crayon] Ardea melanocephala / (Vig. et Chil.) / Sénégal / A. atricollis Wagler Type [écriture plus récente] Ardea melanocephala V.& Ch. / (= Ardea atricollis type de Wagler) / Fl. Prévost. Sénégal. N.C.18 [écriture plus récente]
Inscriptions sur l'étiquette :
Ardea melanocephala V. & Ch. / (= Ardea atricollis Type de Wagler) / Fl. Prévost Sénégal.

Remarques : cet exemplaire représente bien le type de WAGLER car cet auteur précise, à la suite de sa description, que le spécimen décrit est originaire de Sénégambie et qu'il provient de la collection de Fl. Prévost. La description d'*Ardea melanocephala* par VIGORS & CHILDREN a la priorité sur celle d'*A. atricollis* Wagler, 1827, car elle est parue en 1826, un an avant celle de WAGLER. *Ardea atricollis* Wagler en est donc un synonyme plus récent.

Ardea novae-hollandiae Vieillot, 1817.
Vieillot, *Nouveau Dictionaire d'Histoire Naturelle*, Tome XIV : 436.

Premier spécimen, lectotype, présente désignation.
C. G. 1995 – 251.
Nycticorax caledonicus hilli Mathews, 1912.

Source : MNHN, Paris

Inscriptions sous le socle :

Bihoreau Canel / Différent de novae-hollandiae [illisible] c'est l'ardea caledonica [illisible] / Ardea [illisible] [écriture épaisse ancienne, en partie effacée].

Deux étiquettes sont collées sous le socle. Etiquette n° 1 : asie aust. Ctte [pour corvette] le nat.ste [pour naturaliste] / expédit. du Cap. Baudin / an 11 / N.h. par Lesueur / Etiquette n° 2 : Bihoreau de la nelle hollande / Ardea novae hollandiae / [les deux derniers mots sont rayés avec au-dessus une mention illisible] Vieill. nouv. dict. / d'hist. nat. 1817. il a échappé une erreur / dans le texte. On a dit gris pour la couleur / du dos et des côtés du col. Type de Vieillot [encre de Chine très palie]. Nycticorax caledonicus Australasiana [illisible] [écriture un peu effacée mais pas très ancienne] / 14015 / N. C. n° 127 / Bihoreau cannelle / Nycticorax caledonicus (Gm.) / A. australasiana (type de Vieillot.) / M. Péron. Australie [écriture plus récente].

Inscriptions sur l'étiquette :

Bihoreau cannelle / Nycticorax caledonicus / (G m) / A. australasiana (Type de Vieillot) / M. Péron. Australie.

Second spécimen, paralectotype, présente désignation.

C. G. 1995 – 253.

Nycticorax caledonicus hilli Mathews, 1912.

Inscriptions sous le socle :

héron de la n elle holland [sic] / ardea novae-hollandiae Vieill. [le nom latin précédent est barré et remplacé par australasia] / [illisible] glissé une erreur dans [illisible] [écriture ancienne, texte en grande partie effacé] Nycticorax caledonicus (Gould) / A. australiasana (V.) Type / N. C. 126 / 14014 / Bihoreau cannelle / Nycticorax calédonicus / (A. australasiana (Type Vieil.) / M. Péron – Australie.

Inscriptions sur l'étiquette :

Bihoreau cannelle / Nycticorax caledonicus / (Gm.) / – A. australasiana (Type de Vieillot) / M. Péro / Australie.

Troisième spécimen, paralectotype, présente désignation.

C. G. 1995 – 252.

Nycticorax caledonicus hilli Mathews, 1912.

Inscriptions sous le socle :

Nycticorax caledonicus, Gm. / A. australiasana (V.) Type / Péron et Lesueur / exp. du C.ne Baudin / d'Australie / 14016 / [écriture ancienne] Bihoreau cannelle / Nycticorax caledonicus (Gm) (A. Australasiana – type de Vieil.) / Mr. Péron – Australie / N. C. – n° 128.

Inscription sur l'étiquette :

Bihoreau cannelle / Nycticorax caledonicus / (Gm) / A. australasiana. (Type de Vieillot) / M. Péron – Australie

Quatrième spécimen, paralectotype, présente désignation.

C. G. 1995 – 254.

Nycticorax caledonicus hilli Mathews, 1912.

Source : MNHN, Paris

Inscriptions sous le socle :
Nycticorax caledonicus (Gm.) / A. australasiana (V.) Type / jeune de l'année / exp. Baudin / Péron et Lesueur / [écriture ancienne] 14017 [écrit au crayon] N. C. n° 129 / Bihoreau cannelle / Nycticorax caledonicus / A. australasiana. type de Vieil. / Mr. Péron – Australie [écriture plus récente]
Inscription sur l'étiquette :
Bihoreau cannelle / Nycticorax caledonicus / (Gm.) / – A. australasiana. (Type de Vieillot) / M. Péron / – Australie

Remarque : les spécimens ci-dessous sont les mêmes que les précédents car VIEILLOT les a redécrits sous un autre nom.

Ardea australasie Vieillot, 1823.
Vieillot, *Tableaux encyclopédiques méthodologiques*, Ornithologie volume 3 : 1130.

Premier spécimen, lectotype, présente désignation.
C. G. 1995 – 251.
Nycticorax caledonicus hilli Mathews, 1912.

Second spécimen, paralectotype, présente désignation.
C. G. 1995 – 253.
Nycticorax caledonicus hilli Mathews, 1912.

Troisième spécimen, paralectotype, présente désignation.
C. G. 1995 – 252.
Nycticorax caledonicus hilli Mathews, 1912.

Quatrième spécimen, paralectotype, présente désignation.
C. G. 1995 – 254.
Nycticorax caledonicus hilli Mathews, 1912

Remarques concernant *Ardea novae-hollandiae* Vieillot et *Ardea australasie* Vieillot : VIEILLOT a décrit successivement les quatre spécimens ci-dessus en 1817 et 1823 sous les noms de *novae-hollandiae* et d'*australasie* respectivement. Il s'agit de deux adultes et de deux jeunes : les numéros 126 et 127 concernent les adultes, les numéros 128 et 129 les jeunes.

Ainsi que l'a déjà fait remarquer PUCHERAN (1851), la description que donne VIEILLOT pour *Ardea australasie* (1823) ne diffère de celle qu'il a déjà donnée pour *Ardea novae-hollandiae* que par l'addition d'une diagnose latine qui n'apporte rien de plus. Il résulte de cette double description que le nom subspécifique de *novae-hollandiae* a priorité sur celui d'*australasie*. Toutefois, un *Ardea novae-hollandiae* ayant déjà été employé par LATHAM (1790), *A. novae-hollandiae* Vieillot en est un homonyme objectif et la stricte application des règles du Code aboutit au contraire à conserver *australasie*. Dans les deux cas VIEILLOT s'est trompé en décrivant comme grises les parties qui sont normalement brun-roux chez *Nycticorax caledonicus*.

En 1912 MATHEWS considère que l'Australie est habitée par deux sous-espèces de *N. caledonicus*, à savoir *N. caledonicus australasiae*, Vieillot (il change la dénomination *australasie* de Vieillot en *australasiae*, ce qui ne serait plus possible de nos jours) et *N. caledonicus*

Source : MNHN, Paris

hilli Mathews (1912). La description de cette dernière sous-espèce se résume à : « Diffère de N. c. australasiae par sa coloration plus pâle ». La description de VIEILLOT étant erronée, celle de MATHEWS l'est aussi. Lors de la rédaction du troisième volume de son « *Birds of Australia* » (1913-1914), MATHEWS, après avoir pris connaissance de la description de VIEILLOT, exprime l'avis que ce dernier ne pouvait pas avoir eu en main d'authentiques *N. caledonicus* et a supprimé la sous-espèce *australasiae* pour ne conserver pour l'Australie (y compris la Tasmanie) que la sous-espèce *hilli*. La stricte application du Code conduirait à désigner la sous-espèce australienne sous le nom de *australasie* puisque malgré l'erreur de VIEILLOT nous avons bien des spécimens qui sont d'authentiques *N. caledonicus* rapportés par l'expédition Baudin en 1800-1804. Cependant, ce choix serait sans doute malheureux pour la stabilité de la nomenclature car ce nom n'a plus été employé depuis la parution de *Birds of Australia* et est donc devenu un *nomen oblitum.*

Ardea bilineata Cuvier *in* Lesson, 1831.
Lesson, *Traité d'Ornithologie* : 574.

Premier spécimen, lectotype, présente désignation.
C. G. 1995 – 242.
Ixobrychus flavicollis flavicollis (Latham, 1790).
Inscriptions sous le socle :
Ardea bilineata cv / Par M Labillardière / de Java [écriture ancienne] / 13958 / [très pâle] N. C. N° 217 / [très net] Ardea flavicollis / (Cuv. Type) / [écriture plus récente].
Inscriptions sur l'étiquette :
Ardea flavicolli / A. bilineata (Cuv.) T. / Labillardière Java.

Second spécimen, paralectotype, présente désignation.
C. G. : 1995 – 243.
Ixobrychus flavicollis flavicollis (Latham, 1790).
Inscriptions sous le socle :
heron de Java / Par M. Leschenault / 1807 [écriture ancienne]/ Ardea bilineata (cuv.) [autre écriture ancienne] type [écriture plus récente] / Ardea flavicollis (Lath) / 13959 / [même écriture que celle de type] / N.C.– N° 218
Inscriptions sur l'étiquette :
Ardea flavicollis / A. bilineata (Cuv.) T. / Labillardière Java.

Remarques : la description originale d'*Ardea bilineata* se trouve dans le traité de LESSON (CUVIER ne l'ayant jamais publiée lui-même). Cependant LESSON attribue bien cette espèce à CUVIER puisqu'il la nomme *Ardea bilineata*, Cuv. Dans ce cas la dénomination d'*Ardea bilineata* Cuv. est gardée (C.I.N.Z. 3e édition, 1985 ; 90, article 50.a.). La diagnose très succinte de LESSON se termine par « De Java. (Labillardière). » Ce sont donc bien les spécimens ci-dessus qu'il a examinés. Le nom spécifique de *bilineata* Cuv. n'est cependant qu'un synonyme plus récent de celui de *flavicollis* Latham (1790).

Source : MNHN, Paris

Ardea australis Cuvier *in* Lesson, 1831.
Lesson, *Traité d'Ornithologie* : 572.
Type par monotypie.
C. G. 1995 – 244.
Ixobrychus flavicollis flavicollis (Latham, 1790).
Inscriptions sous le socle :
Ex(tion) Baudin / Ardea flavicollis (Lath). / A. australis (Cuv.) type / [cette inscription presque effacée] / Ext Baudin [écrit au crayon] / 13960 [presque effacé] N. C. N° 219 [très net].
Pas d'étiquette.

Remarques : comme pour le taxon précédent la description originale se trouve dans le traité de LESSON (1831) et CUVIER ne l'a jamais publiée lui-même. Cependant LESSON attribue ce taxon à CUVIER puisqu'il le nomme *Ardea australis* Cuv. On garde donc la dénomination d'*Ardea australis* Cuv. (C.I.N.Z. 3e édition, 1985 : 90, article 50.a.). Cette diagnose très succinte ne comprend que quelques lignes et LESSON n'a pas remarqué que *Ardea bilineata* et *Ardea australis* représentaient en fait la même espèce. Dans sa description LESSON précise que le spécimen qu'il a examiné est celui du « voyage de Péron » (Péron était un des membres de l'expédition Baudin). Le nom spécifique d'*australis* Cuv. n'est qu'un synonyme plus récent de celui de *flavicollis* Latham (1790).

Ardea nivea, Cuvier *in* Lesson, 1831.
Lesson, *Traité d'Ornithologie* : 575.
Type par monotypie.
C. G. 1995 – 235.
Egretta intermedia intermedia (Wagler, 1829).
Inscriptions sous le socle :
reçu en 1818 chenault pondicherie [texte ancien repassé à l'encre de chine par la suite] N° 398 / Ardea alba [presque effacé] / Ardea nivea, / Cuv. (type) / Jeune avec [effacé] / mais [effacé] / A. egrettoides / les tarses plus longs qu'[illisible], / le bec blanc tandisqu'il est noir / dans le garzetta; et taille moindre / que ardea timoriensis cv qu'il égale pour / la blancheur. Val. [écriture ancienne] / N. C. N° 53 [autre écriture] / Ardea intermedia / A. Nivea (Cuv.) Type / 13886 [écriture récente] 13886 [noté deux fois au crayon]
Inscription sur l'étiquette :
Moyenne Aigrette / Egretta intermedia / Type (Wagl.) / M. Leschenault Pondichéry.

Remarques : comme dans les cas précédents la description originale d'*Ardea nivea* se trouve dans le traité de LESSON (1831) qui attribue cette espèce à CUVIER sans doute à cause de la mention sous le socle. Dans sa diagnose LESSON note que le spécimen décrit se trouve à la Galerie de Paris, qu'il provient de Pondichéry et qu'il a été raporté par Leschenault, ce qui correspond bien au spécimen C. G. 1995 – 235. La diagnose de LESSON, très succinte, est postérieure à celle de WAGLER publiée en 1827 et *Ardea nivea* Cuv. en est donc un synonyme plus récent.

Source : MNHN, Paris

Ardea pealii Bonaparte, 1826.
Bonaparte, *Annals of the Lyceum of Nat. Hist. of New-York* II. : 154.
Type par monotypie.
C. G. 1995 – 234.
Egretta rufescens rufescens (Gmelin, 1789).
Inscriptions sous le socle :
Individu / figuré American / Ornithology / 4 [illisible] 26 fig 1 [texte presque effacé] / Ardea peali, des Etats unis. / Floride / Bonap. / (type de l'espèce) de la collection / donnée par le Prince / Charles Bonaparte / en 1854. / (Cat n° 1199). / Ardea rufa / (Bodd.) / N. C. n° 212 / Dicromanassa rufescens (= Ardea Pealii / type de Bonap.) / coll. Ch. Bonap. Floride.
Inscriptions sur l'étiquette :
Aigrette roussatre / Dichromanassa rufescens / (Gm) (Ardea Pealii Type de Bp.) / Coll. Ch. Bonaparte Floride.

Remarques : ce spécimen est le type par monotypie d'*Ardea pealii* Bn. Il a fait l'objet d'une représentation graphique dans BONAPARTE 1833 (*American Ornithology* vol. IV : 96, pl. 26 fig.1.) Le nom spécifique de *pealii* Bn. n'est qu'un synonyme plus récent de *rufescens* Gmelin (1789), décrit bien antérieurement.

Ardea ardesiacea Lesson, 1831.
Lesson 1831, *Traité d'Ornithologie* : 575
Type par monotypie.
C. G. 1995 – 247.
Egretta caerulea (Linné, 1758).
Inscriptions sous le socle :
Ardea Coerulea, L / de Cayenne par M. Poiteau avril 1822 / (n° 135) / Ardea / ardesiacea, / Lesson / (type) / 13911 [écriture ancienne presque effacée] N. C. 211 / Petit heron cendré d'Amérique / Florida caerulea (L) / (= Ardea ardesiacea, type de Lesson / M. Poiteau – Cayenne) [écriture récente]
Inscriptions sur l'étiquette :
Petit Héron cendré d'Amérique / Florida coerulea (L.) / (= Ardea ardesiacea type de Lesson) / M. Poiteau Cayenne.

Remarques : d'après les mentions portées sous le socle, ce spécimen est bien celui décrit par LESSON qui, de plus, précise dans son ouvrage qu'il provient de Cayenne. La description d'*Ardea caerulea* Linné (1758) étant bien antérieure à celle de LESSON, *Ardea ardesiaca* Lesson n'en est qu'un synonyme plus récent. C'est de plus un homonyme objectif plus récent de *Ardea ardesiaca* Wagler, 1827.

Ardea callocephala Wagler, 1827.
Wagler, *Systema Avium*, Ardea : 189 sp. 34.
Type par monotypie.
C. G. 1995 – 255.
Nycticorax violaceus (Linné, 1758).

Source : MNHN, Paris

Inscriptions sous le socle :

le bihoreau de Cayenne. buff. Enl 899 / [écriture très ancienne : les 4 mentions qui suivent sont de la même écriture mais ont été rayées par la suite] ardea cayennensis Gm. / ardea violacea. Will vol 8 pl 65 fig 1 / le bihoreau à [mot illisible] / ardea sexsetacea Vieill. Dict. [l'écriture suivante est ancienne et la même que celle qui a rayé les mentions précédentes] / Ardea violacea L. / A. violacea et cayennensis, Gm. / A. violacea et A. sexsetacea Vieill. / A. callocephala Wagl. (T). [l'écriture suivante est plus récente] Martin / De Cayenne [rayé] / de Cayenne / par / Martin / Nycticorax violaceus (L.) / a. callocephala (Wagl.) [autre écriture récente] / Bihoreau à tête jaune / Nyctanassa violacea (L.) / A. violacea (type de Wagl.) / M. Martin. Cayenne [chiffre presque effacé, très ancien et repassé au crayon] 14034.

Inscriptions sur l'étiquette :

Bihoreau à tête jaune / Nyctanassa violacea (L.) / A. violacea (type de Wagl.) / M. Martin. Cayenne.

Remarques : dans son travail, WAGLER (1827) mentionne que le spécimen qu'il décrit se trouve au Muséum de Paris. Après sa diagnose il donne une liste de synonymes à savoir : *Ardea violacea* Wil., Bihoreau de Cayenne Buff., *Ardea cayennensis* Gm. et *Ardea sexsetacea* Vieillot. Dans ces conditions on ne sait pour quelles raisons WAGLER a donné à ce taxon le nouveau nom d'*Ardea callocephala*, qui n'est qu'un synonyme plus récent d'*Ardea violacea* Linné.

SPÉCIMENS CONSIDÉRÉS À TORT COMME DES TYPES

Ardea mokoho Vieillot, 1817.

Vieillot, *Nouveau Dictionaire d'Histoire Naturelle* Tome XIV Ardea : 440.

C. G. 1995 – 237.

Botaurus lentiginosus (Rackett, 1813).

Inscriptions sous le socle :

New-york / par M. milberts 1818 / Ardea minor orn. am. / 8 pl.65 fig 3 / Ardea stellaris Gm Edw 136 / Ardea lentiginosa mont. et Shaw [écriture ancienne sur une étiquette collée sous le socle] / placé à tort parmi les oiseaux d'Europe. / [2 mots illisibles] 13995 / Butor à bandes noires [écriture ancienne] 397 cat. Degland [écrit au crayon] Ardea / mokoho / Vieill. / Wagl. [écriture ancienne] Botaurus lentiginosus / (mont.) / A. mokoko [sic] / type / N. C. n° 207 [écriture plus récente] Butor de la baie d'Hudson / Botaurus lentiginosus (mount.) / A. mokoko [sic] Type de Vieillot / M. Milbert Etat Unis.

Inscriptions sur l'étiquette :

Butor de la Baie d'Hudson / Botaurus lentiginosus / (Mont.) (A. mokoko [sic] Type de Vieill.) / M. Milbert Etats-Unis.

Source : MNHN, Paris

Remarques : le *Nouveau Dictionnaire d'Histoire Naturelle* ayant paru en 1817 et ce spécimen ayant été rapporté du Nouveau Monde par M. Milbert en 1818, il ne s'agit probablement pas de l'exemplaire décrit par VIEILLOT. Plus tard, il a été examiné par WAGLER qui s'est contenté de reprendre le nom que lui avait donné VIEILLOT. Il ne s'agit donc pas d'un type au regard du Code. Dans sa description originale, VIEILLOT, qui savait qu'il s'agissait d'un oiseau américain, l'a nommé mokoho, d'après une appellation indigène, nom repris par WAGLER (1827). L'orthographe «mokoko», utilisée par nombre d'auteurs du XIX^{e} siècle, est erronée.

C'est à RACKETT (1813) qu'il faut attribuer le nom de *lentiginosus* et non à MONTAGU (1813). En effet, la seconde édition du *Catalogue de Pultney*, dans laquelle RACKETT décrit cet oiseau qu'il croyait européen, est parue un peu avant le travail de MONTAGU. Le nom spécifique de *lentiginosus* Rackett, 1813 a donc la priorité. La mention «placé à tort parmi les oiseaux d'Europe» se rapporte sans doute à la place que ce spécimen occupait dans la Galerie.

Ardea melanoptera Cuvier *in* Pucheran, 1851.
Pucheran, *Rev. Mag. de Zool.* : 375.

Premier spécimen, *nomen nudum*
C. G. 1995 – 248
Ixobrychus sinensis (Gmelin, 1789).
Inscriptions sous le socle :
Ardea melanoptera cv / 13966 [ancien, presque effacé] / Ardea sinensis / Gm / Ard. lepida / Horsf. Wagl. / des Mariannes Exp.$^{\text{lion}}$ / freycinet 1820 [écriture ancienne] / Ardetta sinensis (Gm) / A. melanop. / (Cuv.) / type [écriture plus récente] / Blongios de Chine / Ixobrychus sinensis / Type A. melanoptera / (Gm) / L'Uranie. I. Mariannes / N. C. N° 215.
Inscriptions sur l'étiquette :
Blongios de Chine / Ixobrychus sinensis / (Gm) / Type / L'Uranie I. Mariannes / [ajouté à la main sur l'étiquette imprimée après la mention : type] A. melanoptera (Cuv.).

Second spécimen, *nomen nudum.*
C. G. 1995 – 249.
Ixobrychus sinensis (Gmelin, 1789).
Inscriptions sous le socle :
Ardetta sinensis (Gm) / A. melanoptera (Cuv. type) / Exp. freycinet 1820 / Iles Mariannes / 13970 [écriture pâle] / N. C. N° 216 / Blongios de Chine / Ixobrychus sinensis (Gm) / Type A. melanoptera (Cuv.) / L'Uranie. I. Mariannes [écriture plus récente].
Inscriptions sur l'étiquette :
Blongios de Chine / Ixobrychus sinensis / Type (Gm.) / A. melanoptera (Cuv.) [La mention A. melanoptera (Cuv.) est ajoutée à la main sur l'étiquette imprimée] / L'Uranie I. Mariannes.

Source : MNHN, Paris

Remarque : CUVIER n'a pas publié de description de ce taxon. PUCHERAN se contente de le citer et l'attribue à CUVIER (sans doute à cause des mentions sous le socle), également sans en donner de description. Il s'agit donc d'un *nomen nudum* et ces deux spécimens ne sont pas des types au sens du Code.

Gorsachius melanolophus Raffles, 1822.

C. G. 1995 – 240

Gorsachius melanocaphalus Raffles, 1822.

Inscriptions sous le socle :

Héron de l'Inde / par Brossard / fev. 1829 / 14007 / Nycticorax Goisagi Tem [presque effacé volontairement] Individu décrit / Consp. / Avium vol ii p. 138 [écriture ancienne] Type / Botaurus melanolophus / (Raff.) / Gorsakius typus Pucheran / N. C. 143 / [écriture plus récente] Petit Butor de Malaisie / Gorsachius melanolophus / (Raff.) / M. Brossard – Inde. [écriture récente]

Inscription sur l'étiquette :

Petit Butor de Malaisie / Gorsachius melanolophus / (Raffl.) / M. Brossard Inde.

Remarques : ce spécimen est un mâle en plumage nuptial. Nous avons déjà indiqué plus haut (voir *goisagi*) que BONAPARTE (1855) s'était mépris à son sujet en le décrivant comme étant l'adulte de *Gorsachius goisagi* (Tem.). La mention « type » apposée sous le socle signifie seulement que ce spécimen était considéré, avec celui de *goisagi*, comme type du genre *Gorsachius* Bonaparte.

Remerciements

Nous remercions ici le Prof. W. J. BOCK (New York) ainsi que le Prof. J. VUILLEMIER (New York) pour leurs critiques constructives du manuscrit de cet article.

RÉFÉRENCES

(autres que celles des descriptions)

BONAPARTE C. L., 1855. — *Conspectus Generum Avium.* Éd. Brill, Leyde.

HANCOCK J. & ELLIOTT H., 1978. — *The herons of the world.* London Editions, Londres.

MATHEWS G. M., 1912. — A reference list to the birds of Australia. *Novit. Zool.* **18**: 171-455.

— 1910-1927. — *The Birds of Australia*, 12 vol. Witherby, Londres.

MAYR E. & COTTRELLE G. W. (eds)., 1979. — *Peter's Check-list of Birds of the World*, vol. 1, 2nd éd. Cambridge, Muséum of Comparative Zoology.

STRESEMANN E., 1951. — *Die Entwicklung der Ornithologie.* F. W. Peters, Berlin W 15.

VOISIN C., 1993. — Liste des spécimens types d'ibis (Threskiornithinés) de la collection du Muséum national d'Histoire naturelle de Paris. *Oiseau et R.f.O* **63** : 45-53.

VOISIN J.-F., 1992. — Liste provisoire des types d'oiseaux des collections du Muséum national d'Histoire naturelle de Paris. 1. Pélécaniformes. *Oiseau et R.f.O.* **62** : 162-172.

— 1995. — Liste des types d'oiseaux des collections du Muséum d'Histoire naturelle de Paris. 3. Podicipédiformes. *Bull. Mus. natl Hist. nat.*, série 4, A **17** (3-4) : 345-351.

Source : MNHN, Paris

Source : MNHN, Paris

LOUIS-JEAN
avenue d'Embrun, 05003 GAP cedex
Tél. : 04.92.53.17.00
Dépôt légal : 936 — Décembre 1996
Imprimé en France

Date de distribution le 20 décembre 1996

erratum :
Le fascicule n° 1-2 1996 a été distribué le 17 juillet 1996

Source : MNHN, Paris

Source : MNHN, Paris

Source : MNHN, Paris

Source : MNHN, Paris

Mémoires du Muséum national d'Histoire naturelle

Tome 140 : **Dubois, A.**, 1988. — The genus in zoology: a contribution to the theory of evolutionary systematics. 124 p. (ISBN : 2-85653-151-2) 150 FF.

Tome 146 : **Érard, Ch.**, 1990. — Écologie et comportement des gobe-mouches (Aves : Muscicapinae, Platysteirinae, Monarchinae) du Nord-Est du Gabon. Volume 2 : Organisation sociale et écologie des Muscicapinae. 234 p. (ISBN : 2-85653-178-4) 320 FF.

Tome 148 : **Matile, L.**, 1990. — Recherches sur la systématique et l'évolution des Keroplatidae (Diptera, Mycetophiloidea). 704 p. Relié/Hardback. (ISBN : 2-85653-173-3) 650 FF.

Tome 157 : **Chazeau, J. & S. Tillier** (eds), 1993. — Zoologia Neocaledonica, volume 3. 218 p. (ISBN : 2-85653-205-5) 280 FF.

Tome 159 : **Robbe, P.**, 1994. — Les Inuit d'Ammassalik, Chasseurs de l'Arctique. 398 p. (ISBN : 2-85653-207-1) 360 FF.

Tome 163 : **Crosnier, A.** (ed.), 1995. — **Résultats des campagnes MUSORSTOM**, volume 13. 518 p. (ISBN : 2-85653-224-1) 550 FF.

Tome 166 : **Jamieson, B. G. M., J. Ausio & J.-L. Justine** (eds), 1995. — Advances in Spermatozoal Phylogeny and Taxonomy, 550 p. Relié/Hardback. (ISBN : 2-85653-225-X) 440,80 FF.

Tome 167 : **Bouchet, Ph.** (ed.), 1995. — Résultats des campagnes MUSORSTOM, volume 14, 654 p. Relié/Hardback. (ISBN : 2-85653-217-9) 600 FF.

Tome 169 : **Geoffroy, J.-J., Mauries, J.-P. & Nguyen-Duy-Jacquemin, M.** (eds), 1996. — Acta Myriapodologica. 682 p. Relié/Hardback. (ISBN : 2-85653-502-X) 538,69 FF.

À partir de 1993, les *Mémoires du Muséum national d'Histoire naturelle* ne paraissent plus en quatre séries séparées (A, B, C, D), mais en une seule série. Le nom de la revue devient *Mémoires du Muséum national d'Histoire naturelle* (ISSN 1243-4442). La numérotation commence au tome 155.

Vente en France

MUSÉUM NATIONAL D'HISTOIRE NATURELLE

ÉDITIONS SCIENTIFIQUES DU MUSÉUM, PARIS

Diffusion Delphine Henry

57, rue Cuvier, 75005 Paris, France

Tél. : [33] 01.40.79.37.00

Fax : [33] 01.40.79.38.40

Internet http://www.mnhn.fr

Sales Office (France excluded)

UNIVERSAL BOOK SERVICES

Dr. W. Backhuys

P.O. Box 321 2300 AH Leiden

The Netherlands

Tel. : [31] (71) 5 17 02 08

Fax : [31] (71) 5 17 18 56

Internet backhuys@euronet.nl

Prix hors taxes. Frais de port en sus. Vente en France : TVA 2,10 %

Source : MNHN, Paris

Source : MNHN, Paris